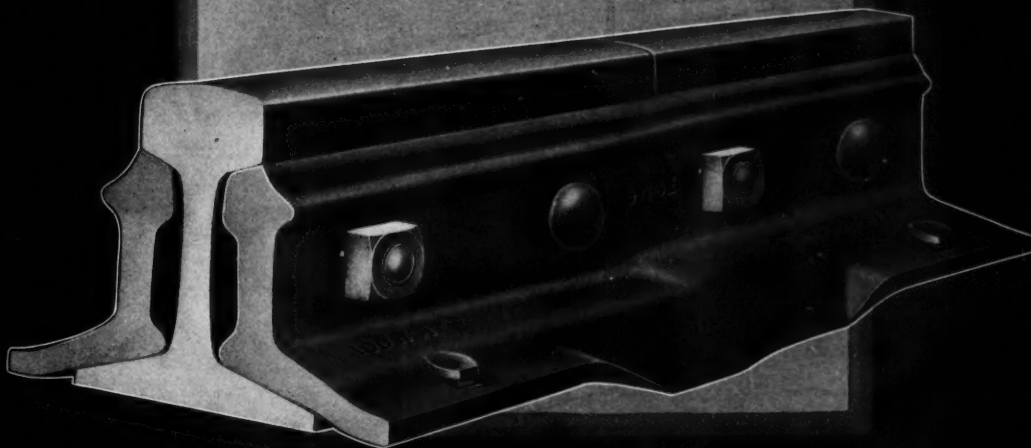


Railway Maintenance Engineer

Volume 13 CHICAGO: Transportation Building NEW YORK: Woolworth Building DECEMBER, 1917 CLEVELAND: Citizens' Building WASHINGTON: Home Life Building Number 12

Q and C *Rolled Steel* Step-Joint

Being *Rolled Steel* a perfect
and accurate fit is assured—
a feature that is not possible
with a cast metal joint



The Q and C Co.
90 West St. New York

Chicago
Peoples Gas Bldg.

Standard Railway Devices

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Railway Exchange Bldg.

FROGS = SWITCHES = STANDS

Manganese and Built-Up Construction

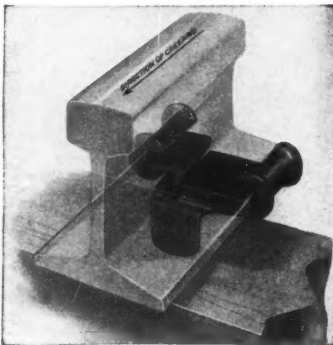
IN STOCK for IMMEDIATE SHIPMENT

THE INDIANAPOLIS SWITCH & FROG COMPANY

NEW YORK

SPRINGFIELD, OHIO

CHICAGO



THE P. & M.

RAIL ANTI-CREEPERS

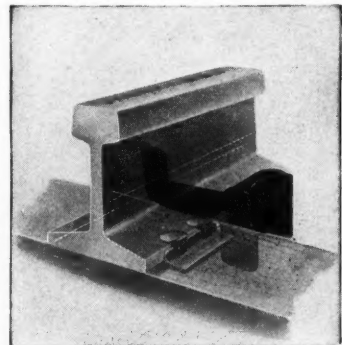
EFFECTIVE — EFFICIENT
UNIVERSALLY USED

THE P. & M. CO.

RAILWAY EXCHANGE
CHICAGO

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ST. PAUL

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DENVER



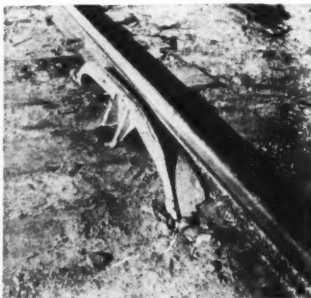
THE VAUGHAN

ESTABLISHED 1882

THE WEIR FROG CO.

*Track Work of Rail and
Manganese Steel Construction*

CINCINNATI --- --- --- --- OHIO



Note the foot guard and the wearing insert. Weight 80 lbs.

Tailor Made GUARD RAILS

To suit your special requirements,
for less money than you are now paying.

WRITE FOR CATALOGUE

National Steel Products Co., Inc.

Ensley, Alabama

Where INTERNATIONAL STEEL CROSSING FOUNDATIONS *Are Being Installed This Year*

Atchison, Topeka & Santa Fe Ry.,
Geneva, Seneca Falls & Auburn Ry.,
New York, New Haven & Hartford R. R.,
Boston Elevated Railway,
Boston & Albany R. R.,
Cincinnati, New Orleans & Texas Pacific Ry.,
Louisville & Nashville R. R.,
C. C. C. & St. L. Ry.,
Springfield (Ohio) Ry.,
American Railways,
New York, Ontario & Western Ry.,
Lake Erie & Western R. R.,
Union Traction Company of Indiana,
Tri City Ry.,
New York Central & Hudson River R. R.,
Chicago, Rock Island & Pacific Ry.,
C. & E. I. R. R.,
Central New England Ry.,
Louisville Ry.,
Terre Haute, Indianapolis & Eastern Traction,
Mason City & Clear Lake R. R.,

Minneapolis & St. Louis R. R.,
Decatur Ry. & Lt. Co.,
Wabash Railroad,
Danville Ry. & Lt. Co.,
Denver Tramways,
Lewiston, Augusta & Waterville St. Ry.,
Maine Central R. R.,
Reading Transit & Lt. Co.,
Philadelphia & Reading Ry.,
Chicago Great Western R. R.,
Missouri Pacific Ry.,
Illinois Traction System,
Kentucky Traction & Terminal,
Queen & Crescent Route,
B. & O. S. W. R. R.,
Cincinnati Traction,
Stark Electric Ry.,
Pennsylvania Lines West of Pittsburgh,
Wheeling & Lake Erie R. R.,
Southern Pacific,
Northern Ohio Traction & Light Co.

*If your company's name in the list? These companies
are protecting their crossing frog investments.*

Let us show you why, and how moderate the cost.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES

Western Eng'g Sales Co.,
Los Angeles, Cal.

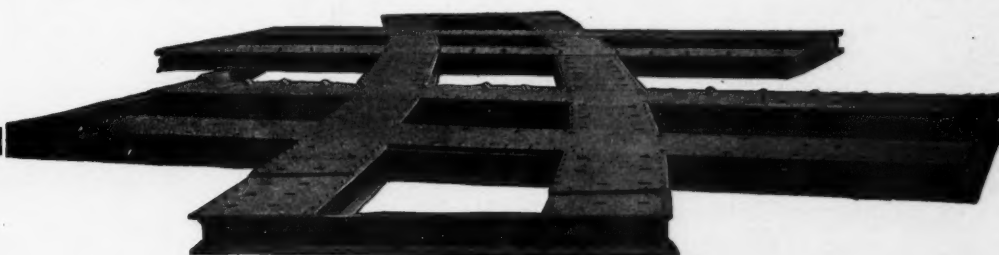
San Francisco, Cal.
Seattle, Wash.

R. J. Cooper Co.,
Salt Lake City, Utah

J. E. Lewis & Co.
Dallas, Texas.

Maurice Joy,
Philadelphia.

William H. Ziegler,
Minneapolis, Minn.





No. 500
Snow Shovel

No. 600
Snow Shovel

Loosen Winter's Grip

Reliable and dependable track equipment is needed now to fight deep snow and drifts.

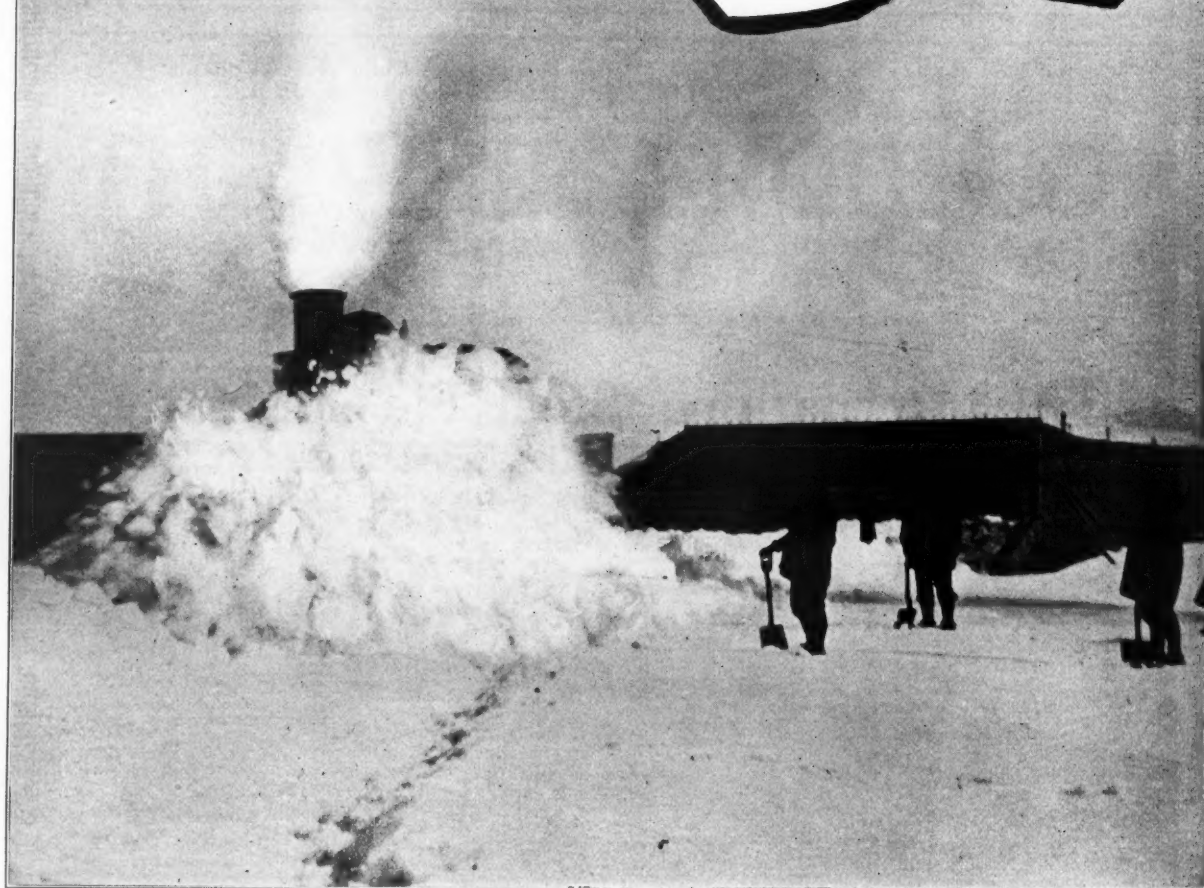
HUBBARD SNOW SHOVELS

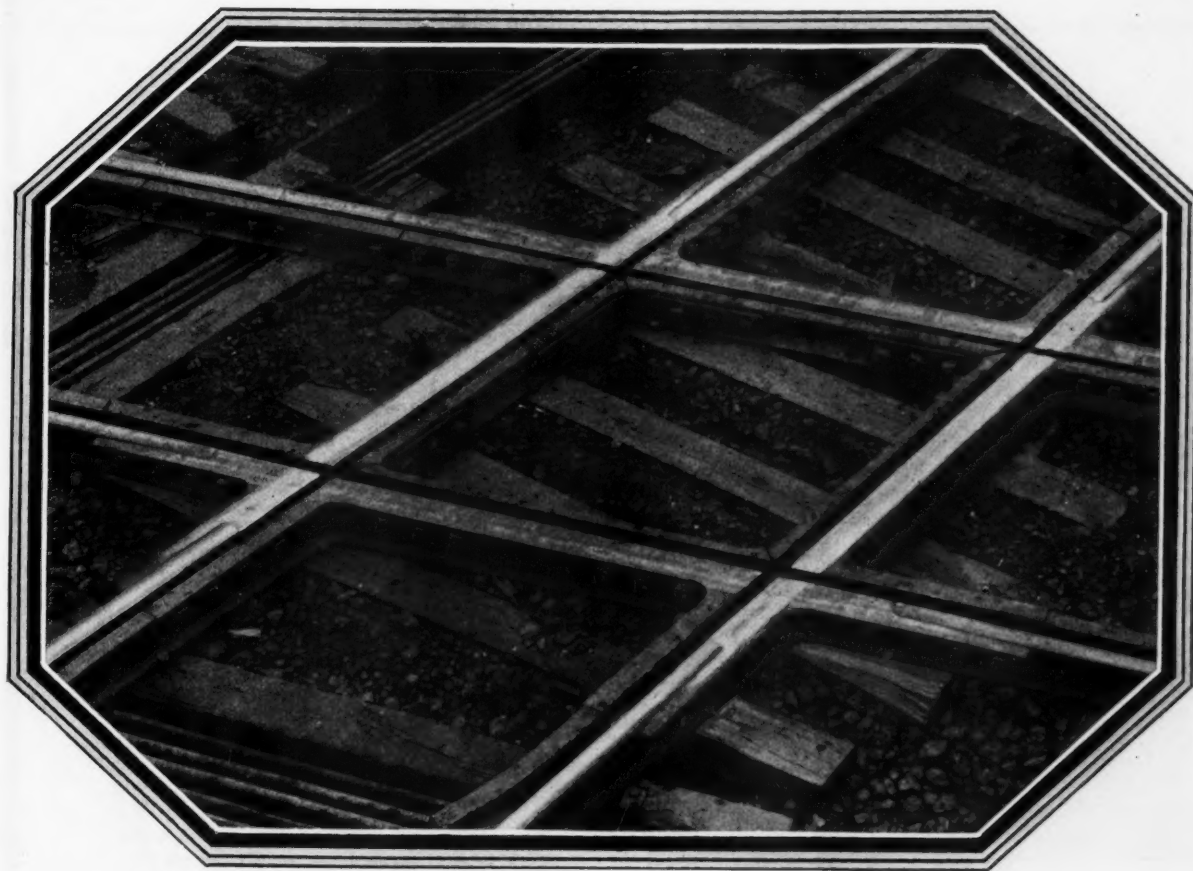
are built to stand long service and hard usage. Made of High Carbon Steel with straight-grain ash handles and backed by the "Hubbard" guarantee:

If any Hubbard tool proves defective in any way, prompt replacement will be made without charge.

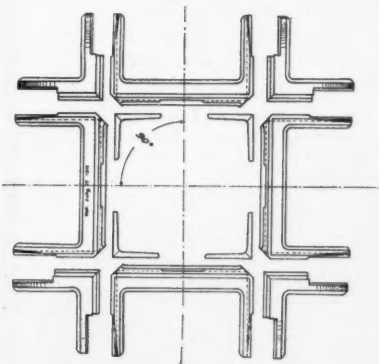
Write for catalog and prices.

**Hubbard & Co.
Pittsburgh, Penna.**





100% Crossing Wear



Joints at flangeway intersections positively eliminate breakage.



The high resistance to wear of manganese crossings has been fully demonstrated. Their economy is proved. One serious difficulty to be met, where the intersections are cast solid, is breakage which starts at the flangeway intersections, making it necessary to discard the crossing before it is worn out.

This difficulty is overcome by a crossing of new design, built in eight sections with joints scientifically placed where breakage formerly occurred. It is called the

Balkwill Articulated Cast Manganese Crossing

—articulated, because the sections are free to weave an infinitesimally small amount in relation to each other, avoiding the strains which break the old style crossings cast solid at flangeway intersections.

Balkwill crossings have been placed at intersections of thirteen different roads where they receive the hardest kind of service. Some of them have been in service for two and a half years. They are showing very low maintenance cost as compared with the fabricated rolled rail crossings, and will give 100% wear before renewal is necessary, thereby saving many interruptions to traffic which frequent replacements of the old style necessitated.

The Balkwill, Articulated, Cast Manganese Crossings have proved their superiority and economy under heavy traffic. Request your frog maker to furnish this type. If he has not taken out a license to manufacture these crossings, don't accept a substitute. Write us direct. We will gladly co-operate with you to solve your crossing problems.

The Balkwill Manganese Crossing Co.
1808 East 82nd St., Cleveland, Ohio



The Motor Car and Labor Shortage

Perhaps no branch of railroad work has suffered so much from labor shortage since the war as the Maintenance of Way Department. General improvement, such as laying of heavier rails, new ballasting, additional side tracks and new terminals, is practically at a standstill—paralyzed for want of sufficient labor to handle the work. Where such work is being carried on section crews are obliged to “club together” in order that enough labor may be had. This is where the motor car plays its part. Men, tools, materials are moved from one point to another much quicker than was heretofore thought possible. Each foreman, if he owns or operates a motor car, increases his worth and efficiency several hundred per cent. His working range is extended from five or six miles to twenty-five, thirty-five, fifty—yes, and even one hundred miles.

The motor car is helping in many ways to relieve the increasing demand for freight cars and locomotives. Instead of wasting time in switching and unloading material from material trains in the most advantageous places, material can be handled from a central unloading point, by motor cars with push car trailers, at a great saving in expense. By doing this the locomotive and cars, that would be required to distribute the material, can be put into freight service.

The utter necessity for carefully maintaining all main line track this fall and winter in order that the enormous quantities of supplies for our armies in France and at the various training camps may be transported with safety and dispatch is quite apparent. Every section foreman should have a reliable motor car if this is to be done.

For years Fairmont engines and motor cars have been standard on many of the largest trunk line railroads. For real efficient and economical service they have no equal or no superior.

Every section foreman can have a motor car. How?

A card sent to the address below will bring you the answer.

**Fairmont Gas Engine & Railway
Motor Car Company**

423 N. Main Street,

Fairmont, Minn., U. S. A.

Illinois Division Has Model Wrecking Train

Both Comfort of Crew and Mechanical Equipment Amply Provided For

THE work of fitting up a wrecking and relief train, modern in every detail and equipped with every thing needed in that work, has recently been completed at the Illinois Division shops on the Indiana Division. The work was done under the direction of general car foreman A. Teed and wreckmaster W. E. White, Division superintendent of the Indiana Division. The men are entitled to much credit for this exceptional wrecking outfit.

The crane is always kept under steam and is ready for service at a moment's notice. The "Big Hook," as it is generally called, takes a prominent part in shop work, being especially valuable for wheeling and unwheeling locomotives in the shops, and in the car department for handling steel underframes for the equipment being built at the following shops.

A glance at the pictures on the following pages will show that while fitting out the train with modern and efficient equipment for handling the work required in wrecking service the comfort and welfare of the men composing the crew was not lost sight of. On being provided by the Company with such sanitary and pleasant quarters the men decided to keep their quarters in apple-pie order, and have done this well that they have been highly praised by various officials who have inspected the train.

There is a pleasant dining car and a clean and tidy kitchen provides the crew with wholesome food. The kitchen is most completely equipped. It has hot and cold water tanks and a refrigerator, and a cupboard is provided in which all the necessary crockery and glassware is stored. The sleeping car, which is equipped with clean and comfortable steel beds, will accommodate sixteen men. The tool car is a miniature shop, fitted up with everything that may be needed in the work of the crew.

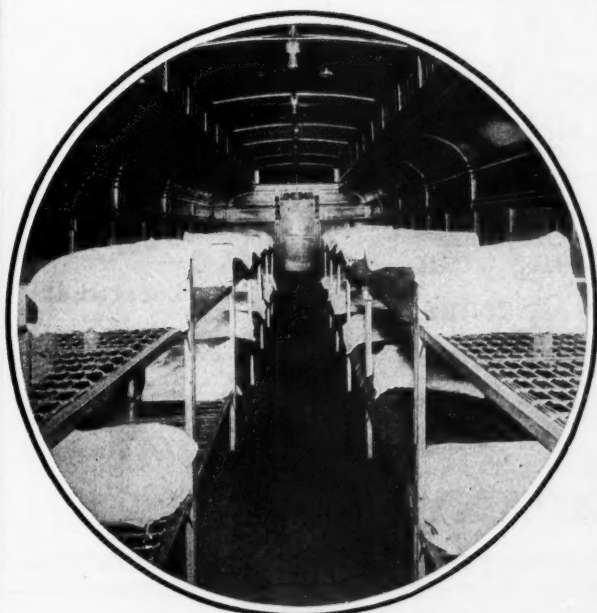
Comfort That Pays

The wrecking crew must be "on its toes" day and night—ready for any emergency. Railroads find it a paying proposition to keep these crews as near top notch efficiency as possible—that it pays to have their personnel and equipment the best obtainable.



One of the features in equipping a *modern* wrecking train that receives careful consideration is the sleeping quarters. On the road from whose employees magazine the above page was clipped

Romelink All-Metal Bunks



are provided for the accommodation of wrecking crews.

These bunks were chosen for their comfort, cleanliness and durability. With no corners or crevices to collect dirt and harbor vermin, it is a simple matter to keep sleeping quarters clean and sanitary. The patent *sagless* spring makes an even, comfortable bed. Steel frames stand the hard service, never break, and always look clean and sightly. Romelink Bunks in your work cars and construction camps will make a big difference in the efficiency of your men. Let us prove why.

Southern-Rome Co.

617-633 West Pratt Street
Baltimore, Maryland

The Endurance Test —

has definitely proved by actual exposure, that the user can place *Keystone Copper Steel Sheets* anywhere that sheet metal is used and be assured of the maximum of wear and resistance to rust.

The copper-steel alloy has established its superiority for Black and Galvanized Sheets, Roofing Tin Plates, Culvert stock, Corrugated Roofing, Spouting, and all exposed sheet metal work. When this material is used it is indicated by the Keystone added below regular brands.



American Sheet and Tin Plate Company

General Offices: Frick Building, Pittsburgh, Pa.

DISTRICT SALES OFFICES:
 Chicago Cincinnati Denver Detroit New Orleans New York Philadelphia Pittsburgh St. Louis
 Export Representatives: UNITED STATES STEEL PRODUCTS COMPANY, New York City
 Pacific Coast Representatives: UNITED STATES STEEL PRODUCTS COMPANY, San Francisco, Los Angeles, Portland, Seattle

Massey Concrete Railway Products

have an established reputation. Years of satisfactory service explain why veteran railway men choose MASSEY MADE culverts, cattle passes, bridge slabs and battery wells.

Permit us to assist you in solving your problems economically and permanently. A postal will bring you information covering your particular needs.

C. F. MASSEY COMPANY

General Offices: Peoples Gas Bldg., Chicago

District Sales Offices

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New York City

Sumpter Building
Dallas, Texas

3430 Cooke Street
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3710 South Alameda Street
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Plants Located at

Youngstown

Newark

Chatham, Ont.

Minneapolis

Chicago

Kansas City

Memphis

Meridian

Dallas

Spokane

Los Angeles

How lateral movement
of spout prevents
column being knocked
down



**How many of
your water
columns are
knocked down every year?**

What do the repairs and maintenance—not the result of ordinary use—cost you?

Avoid this annoyance, trouble and expense by using a

POAGE Style "H" WATER COLUMN with FENNER DROP SPOUT

The three foot lateral range in the Fenner spout and the steel riser in the Poage Style H save the water column from being knocked down by the shifting of the tender.

The tender has to leave the track to knock this column down.

The flexible spout makes it unnecessary to spot the tender accurately. You save time by quick adjustment.

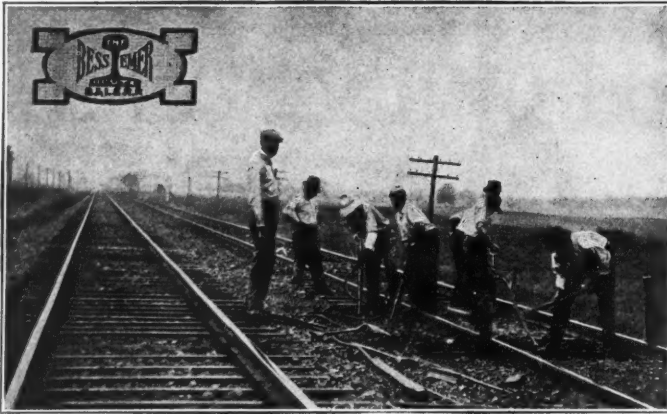
The five foot up and down range enables the water column to fill a tender of any height.

The open telescopic joint does not waste a drop of water. It banishes the usual winter time troubles. Ice does not collect upon it.

The valve permits the maximum amount of water to flow in the shortest time. There is a minimum of frictional resistance. It shuts the water off quick without water hammer.

Try the Poage Style H column. You will find that it has remarkable operating advantages.

**MANUFACTURED EXCLUSIVELY BY
THE AMERICAN VALVE & METER CO.
CINCINNATI, OHIO**



Imperial Tampers
Tamping
Slag Ballast
Under
Steel Cross Ties
On the
Bessemer and
Lake Erie

"IMPERIAL" TIE TAMPERS

The experience of the many lines which have adopted them has proven their economy in tamping all kinds of ballast under all conditions. They effect a decided increase in the working speed of the maintenance gang, ballast track more firmly and enable a very important labor saving.

Next season will find you even more short-handed than the past. This pneumatic equipment can equalize the deficiency—plan now to install "Imperial" Tampers.

Ask for a copy of Bulletin 9023

11 BROADWAY
NEW YORK

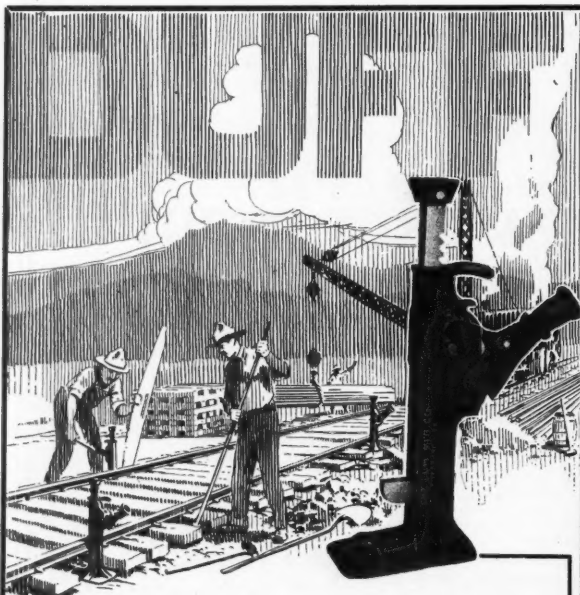
INGERSOLL-RAND COMPANY

165 Q. VICTORIA ST.
LONDON

IMPERIAL PORTABLE COMPRESSORS

OFFICES THE WORLD OVER

PNEUMATIC TRACK TOOLS



TRACK JACKS

For constructing, surfacing, ballasting and repairing railroad track, Barrett Track Jacks are the recognized standard tools used by practically all railroads. They conform strictly to the requirements of the Roadmasters Association of America, are quick acting, positive, and durable. Manufactured in a large number of sizes, they are adapted to every condition. Made in both single and double acting types. Send for 150-page illustrated catalog.

THE DUFF MFG. CO., Established 1883 **Pittsburgh, Penna.**
New York Chicago Atlanta St. Paul San Francisco



THE PIPE OF SHORT UNITS, LONG SERVICE, AND LOW COSTS

HOW it is saving money in annual culvert renewals.

The pipe of short lengths—3, 4 and 5 ft. easy to transport, handle and install.

Rethread the old culvert and back fill with cement, that's all, save Safety, Saving and Service.

Forty odd railroads are using "National" for the standard solution of the Culvert Renewal Problem.

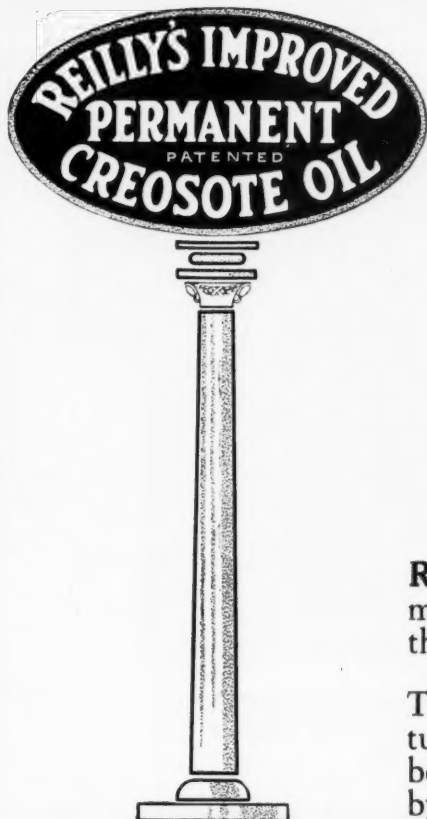
Catalogue and Prices on request.

AMERICAN CASTING CO.
Birmingham, Ala.



Chicago Office: - Peoples Gas Building
New England Representative
Fred A. Haudette & Son, Boston, Mass.
St. Louis Representative
H. P. Webb - Wainwright Building
St. Paul Office
Contractor's Supply and Equipment Co.
Blair & Co., Bankers Investment Co.,
San Francisco, Cal.





THE SAFETY SIGNAL

Reilly's Improved (Permanent) Creosote Oil means safe timbers—for it permanently prevents the entrance of decay germs or insect enemies.

This oil was developed by the oldest manufacturer in America. It is offered as by far the best product on the market for treating timbers by the empty-cell process.

Its superiority lies in the fact that it contains at least three times as much permanent body as the best oil heretofore available—and but a trace of volatile elements.

At 250 degrees C. less than 1% of this oil distills—and at 315 degrees C. more than 75% remains. Exhaustive field tests have proved that the value of any preservative oil depends entirely upon its purity and its permanent body—hence this oil is at least three times as efficient as its nearest competitor.

Its penetrability is equal to the more volatile products and it not only coats the

fibres but also fills every cell and interstice with a solid impermeable mass.

Water cannot enter between the fibres, as is the case with volatile oils that gradually evaporate, dissolve, or leach away.

Reilly's Wood Preservative Oil

(Patented)

is our best product for open tank or brush treatment. A high-boiling anthracene oil—limpid and free-flowing at working temperatures. Contains no adulterant or volatile products.

Send for Sample

The surface coating forms a splendid and permanent lubricant for tie plates and the oil between the fibres does much to offset the breaking-down action of internal friction.

Samples will be gladly submitted and we can make prompt shipment. We will also be glad to submit quotation on treated ties and dimension timbers of all description.

Republic Creosoting Company

Indianapolis, Indiana

Plants:

Indianapolis

Minneapolis

Seattle

Mobile

Steel for Service

Many a contractor has learned too late that sheeting of some kind should have been used at the beginning of an excavation job.

Have you ever had banks cave in and so lose a great part, if not all, of your estimated profits?

United States Steel Sheet Piling

is a very useful tool in a contractor's equipment. In many cases where the nature of the work permits it is pulled and redriven repeatedly in different sections of the job and when that job is completed the piling can be placed with your equipment or, if desired, usually disposed of at a fair price.

Pamphlet—Steel Sheet Piling—contains valuable information to contractors and can be obtained from any district office.

The mark of
quality



It protects the
user

Carnegie Steel Company

General Offices—Pittsburgh, Pa.

874

Goulds Fig. 3030
Single Stage
Double Suction
Centrifugal
Pump.



Good for Capacities up to
8,000 gallons per minute against heads up to 150 feet

GOULDS FIG. 3030 SINGLE STAGE DOUBLE SUCTION CENTRIFUGAL PUMP

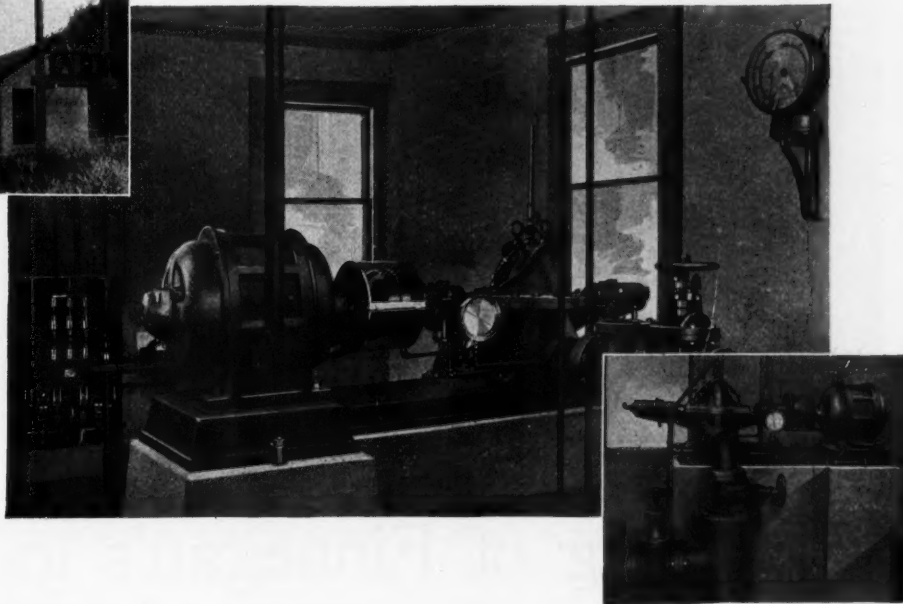
This is a high efficiency pump widely used for general water supply pumping, hot water circulating in heating systems, for irrigating, drainage, booster and mine service and many similar services within the rating of the pump.

Pump is furnished for direct connection to electric motors, steam turbines, steam engines or other drivers, or with pulley for belt drive.

A copy of Bulletin 110 giving complete data on this line of pumps will be mailed on request.

The Goulds Manufacturing Company
MAIN OFFICE AND WORKS
Seneca Falls, N. Y.

New York 16 Murray St. Boston 40 Pearl St. Chicago 12-14 S. Chicago St. Philadelphia 111 North 2nd St. Pittsburgh 424 Henry W. Oliver Bldg. Atlanta 2nd Nat'l Bank Bldg. Houston 1001 Carter Bldg.



Reducing the Power Cost by a Remotely Controlled Waterworks Pumping Unit

Fort Atkinson, Wis., had been pumping water with steam but was able to get a low rate for electrical power transmitted from Milwaukee.

About a year ago they put in at the main pumping station an electrically driven "American" 4-inch single stage, double suction, bronze fitted, horizontal centrifugal pump having a daily capacity of 1,000,000 gallons against a total head of 175 feet when operating at 1750 r.p.m.

The performance of this unit was so satisfactory that the city decided to make a further saving in power by putting in an auxiliary pumping plant to remove the peak load and thus obtain a lower rate for power.

The city owns a flowing well, located about 4000 feet from the central pumping station. At this well was installed an "American" 2½ inch, horizontal, single stage, double suction, bronze fitted, centrifugal pump operated by a 20 h.p., 3 phase, 60 cycle, 220 volt, squirrel cage type, 1800 r.p.m. General Electric motor and having a capacity of 310 g.p.m. against a total head of 180 feet. The duty of this pump was to deliver water to an elevated storage tank.

In addition to the transmission line between the main station and the small auxiliary plant a single No. 10 iron wire was strung to control the equipment. A Sundh Electric Co.'s control panel for operating the motor was placed in the new plant. At each end of the control line is a single pole, double throw knife-switch so arranged that the equipment can be operated from either end of the line. By throwing the knife switch in the other direction from the one in which it was not operating the pilot light would glow, showing the pump in operation, and so long as the lamp was lighted the operator knew the pump was in service.

The performance of this plant was so perfect that during the first month of service it was not visited by the operator in the main station.

A G. E. flow meter is attached to the discharge of the pump and this indicates that there is an over all efficiency between the power charged to the pumping plant and the net amount of water pumped into the mains of approximately 50 per cent. This economy is only made possible by the high efficiency and great reliability of the pump.

Write for catalog 149 describing this and over 50 other styles of "American" centrifugals.

The American Well Works

General Offices and Works: Aurora, Illinois, U. S. A.
Chicago Office: First National Bank Building

District Sales Agencies:

New York City
Philadelphia, Pa.
Pittsburgh, Pa.
St. Paul, Minn.
St. Louis, Mo.

Dallas, Texas
Birmingham, Ala.
Kansas City, Mo.
Joplin, Mo.
Lincoln, Neb.

Denver, Colo.
San Francisco, Cal.
Salt Lake City, Utah
Los Angeles, Cal.
Artesia, N. Mex.

Edmonton, Ala.
Calgary, Alta.
Chatham, Ont.
Montreal, Canada



The passing of Finnegan's gang

No. 2

GARFIELD the roadmaster swung off No. 8 and walked over to a siding where a section gang with a loaded car was standing.

"Good Morning, Finnegan," he said. "The last time I saw you it took five men to push that car of yours; now, three do the trick. Where are the other two?"

"Down the line a bit, earnin' their money sor," said Finnegan. "It don't take the whole gang to push the car these days, nor tire the whole crew out pumpin' the hand car nather," he added.

"You fellows growing strong?" asked Garfield.

"Goin' sthrong, ye mane," Finnegan replied, "and sthrong for Hyatt Bearin's on our cars,

sor. Faith its surprised we were the day we got this car back. We loaded her up and off she goes aisy like. Mike there stopped to light his poipe, but she ran so aisy that not a mither's son noticed. That shtarted me thinkin'. 'Pat!' says I, 'rest up a bit.' Pat quit and the car wint right along. 'Dennis,' I calls out, 'leggo that car.' And would ye belave it, Misther Garfield, that car ran jist as aisy with one man pushin' as it did before with two or three? That manes more worrk the day and less back ache the night, an' its thim Hyatt Bearin's that did the thrick," concluded Pat. "Shake on that, Finnegan," said Garfield.

* * * *

Back to the station walked the roadmaster, a smile on his face. 50% saving in the energy

HYATT BEARINGS



required to operate this section car looked big to him. And Hyatt Bearings would save him from 40% to 50% of his gasoline expense on his gasoline cars. Labor and gasoline are high these days! such savings meant big money and Garfield felt that he was on the right road towards lower maintenance costs—the problem the Division Superintendent had put up to him.

Hyatt Roller Bearing Company

NEWARK, NEW JERSEY

Manufacturers of bearings for mine cars, machine tools, trolleys, cranes and hoists, conveyors, steel mills, concrete mixers, line shafts, countershafts, etc.

And Garfield was right. Hyatt Bearings on your section cars not only increase the efficiency of the men by allowing them to expend their time and strength on useful work, but

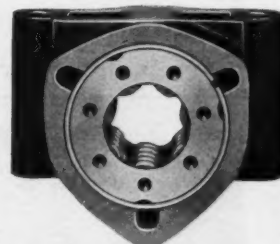
prove an important factor in holding labor. The story of "The Passing of Finnegan's Gang" is to be continued. Garfield's problems are not different from yours and you can learn much from his experiences.

LIST OF MANUFACTURERS AND BOXES THEY CAN FURNISH YOU

Fairbanks-Morse Co.....	Chicago, Ill.
Boxes for their hand and push cars	
Kalamazoo Ry. Supply Co.....	Kalamazoo, Mich.
Boxes for their hand or push cars	
The Buda Company.....	Chicago, Ill.
Boxes for their hand and push cars	
Mudge & Company.....	Chicago, Ill.
Boxes for their motor cars	
Fairmont Gas Eng. and Ry. Motor Car Co.....	Fairmont, Minn.
Boxes for all Fairmont cars—and all other makes of hand and push cars	
Northwestern Motor Co.....	Eau Claire, Wis.
Boxes for extra gang cars only	
International Equipment Co....	Montreal, Quebec, Canada
Boxes for all section cars.	



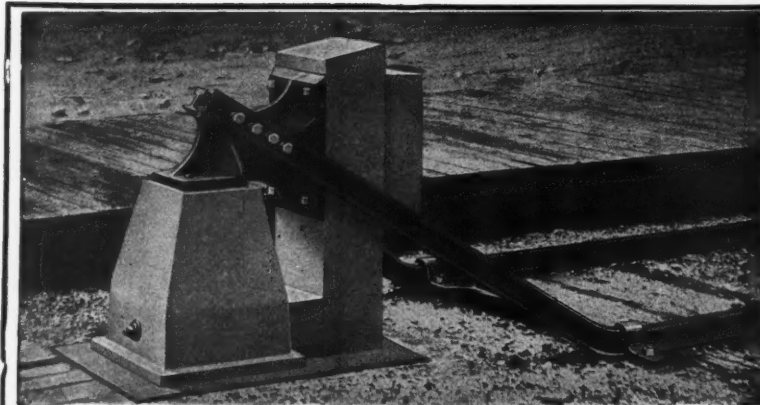
Replacement box equipped with Hyatt Roller Bearing ready for installation on motor car.



Replacement box equipped with Hyatt Roller Bearing ready for installation on push or pump car.

1114

FOR SERVICE CARS



ELLIS PATENT Bumping Post

Simple, Strong and Lasting
Adapted to All Positions

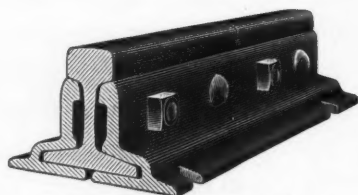
Mechanical Manufacturing Co.
Chicago, Ill.

The Rail Joint Co.

GENERAL OFFICES:

61 Broadway

New York City



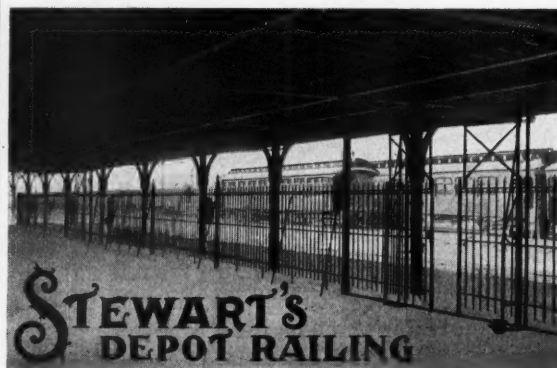
Continuous Rail Joint

Makers of Continuous, Weber,
Wolhaupter and 100% rail joints.

Standard—Insulated—Step—Frog
and Switch Types.

Grand Prize San Francisco
1915

Protected by Patents



For twenty-five years Stewart equipment has proved its superiority for Right of Way Fence, Inter-track Fence, Iron and Wire Window Guards, Baggage Room and concourse enclosures on every important railroad.

The oldest installations from the standpoint of strength, service and perfect appearance cannot be distinguished from the new.

The world's largest factory and finest reputation is behind

**STEWART'S
IRON FENCE**
"The Standard of the World"

A corps of designers who will gladly help you solve your fencing problem are at your immediate service.

To make sure of quality iron, mechanical perfection, modern design and universal approval—investigate, specify and insist on Stewart's.

THE STEWART IRON WORKS CO.
700 Stewart Block Cincinnati, Ohio

"World's greatest iron fence builders."



RAMAPO

Automatic Safety Switch
Stands are Manufactured only by the

Ramapo Iron Works

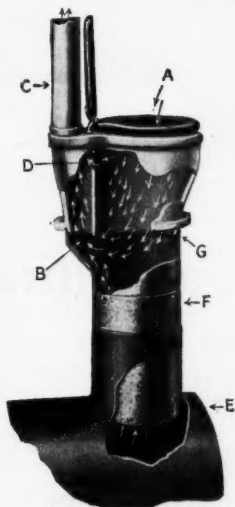
Write for Descriptive Catalogues on
Switch Stands, Switches, Frogs, Guard
Rail Clamps, Etc.

Manganese Track Work a Specialty.

Ramapo Iron Works Main Office:
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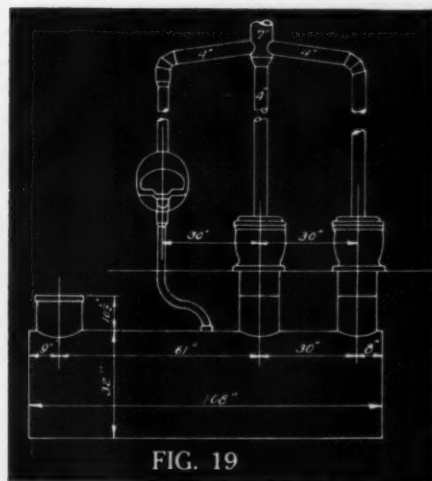
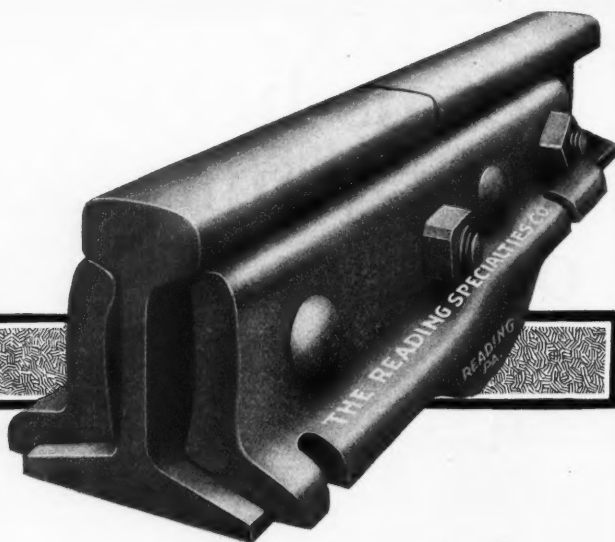


FIG. 19

Installation of two Bowls and a Urinal.

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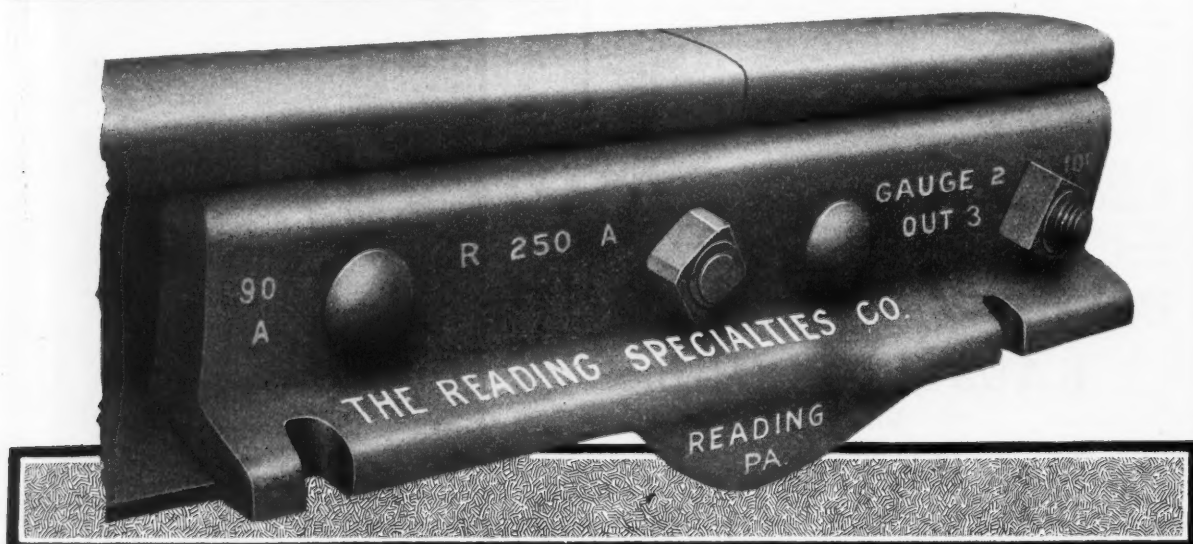
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Railway Maintenance Engineer

Volume 13

December, 1917

Number 12

(With which is incorporated the Engineering and Maintenance of Way Edition of the *Railway Age Gazette* and *Railway Engineering and Maintenance of Way*.)

Published on the last Thursday preceding the date of issue by the
SIMMONS-BOARDMAN PUBLISHING CO.,
TRANSPORTATION BUILDING, CHICAGO, ILL.

NEW YORK: WOOLWORTH BLDG. CLEVELAND: CITIZENS' BLDG.
WASHINGTON: HOME LIFE BUILDING.
LONDON: QUEEN ANNE'S CHAMBERS, WESTMINSTER.

EDWARD A. SIMMONS, President. LUCIUS B. SHERMAN, Vice-President.
HENRY LEE, Vice-President and Treas. M. H. WIUM, Secretary.
H. H. SIMMONS, Business Manager, CHICAGO.

ELMER T. HOWSON, Editor.

WALTER S. LACHER, Managing Editor. JOHN G. LITTLE, Associate Editor.

Entered at the Post Office at Chicago, Ill., as mail matter of the second class.

Subscription price, including the twelve regular monthly issues of the *Railway Maintenance Engineer* and the four daily issues of the *Railway Age Gazette*, published in connection with the annual convention of the American Railway Engineering Association: United States, Canada and Mexico, \$1.00; foreign countries (excepting daily editions), \$2.00.

WE GUARANTEE that of this issue 8,100 copies were printed; that of these 8,100 copies, 7,434 were mailed to regular paid subscribers, 125 were mailed to advertisers, 73 were mailed to exchanges and correspondents, and 468 were provided for new subscriptions, samples, copies lost in the mail and office use, that the total copies printed this year to date were 96,460, an average of 8,038 copies a month.

The *Railway Maintenance Engineer* is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulations (A. B. C.).

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One of the most disagreeable duties of the average foreman and the one which he usually performs least satisfactory is the preparation of his time roll, time and material distribution and other reports required by his superior officer. Having received his training out on the work, he feels that he is a man of action rather than of words —of the field rather than of the office, and he has acquired a dislike for clerical work. In this attitude he is frequently supported more or less openly by his supervisor, who, like himself, feels that reports were originated to cause a foreman needless worry and correspondence rather than to furnish the office with necessary information. As a result, the reports of the average foreman have been far from accurate, and these inaccuracies have necessarily extended into the final accounts. It is unfortunate that this attitude toward reports exists among foremen, for it creates almost needless correspondence between them and the office and, in the end, many of the records are so inaccurate that it is unsafe to draw conclusions from the information compiled from them. Of late years the increased attention which has been given to records in all departments, prompted largely by the demands for information by the national and state railway commissions, has resulted in a material improvement in the character of railway statistics, but much yet remains to be done to bring the records to the desired perfection. The first essential to improvement is a more general realization on the part of all concerned of the fact that the reports of the foremen who actually perform the work furnish

the original data on which all later statistics are based and that no information can be more accurate than the data on which it is founded. This should lead the supervisors and the office men to realize the importance of training the foremen in the proper ways of reporting the information called for. It will also give the foremen themselves a fuller realization of the real importance of their records and of the dependence of their superior officers on them for much of the information they require in making reports to their higher officers. The series of articles on the accounts of the maintenance of way department, the first of which appears on another page in this issue, have been prepared with the idea of pointing out to the men employed in the maintenance of way department the reasons for the various reports commonly made and to indicate the fact that these reports are required for definite purposes and are not the result of some officer's idle fancy. The importance of records of performance is increasing from year to year in all industries and the successful foreman of the future will be more of a bookkeeper than his predecessor.

The report of the Convention of the Maintenance of Way Master Painters' Association on another page of this issue draws attention to a phase of maintenance of way work that bids fair to be overlooked under the stress of these trying times. When men put off the painting of their homes because of the extreme high cost it is but natural to expect corporations to do likewise. However, owing to the great reduction in the amount of painting done,

Don't Forget the Painting Schedule

the labor situation among painters is not as serious as among other classes of workmen employed in maintenance of way. On the other hand, as pointed out in the course of the convention, paint materials are growing very expensive and certain ingredients are becoming very scarce. When, however, we compare the cost of the paint with the cost of the structures which they protect the relation does not differ so widely from that obtaining in normal times, and as one speaker expressed it at the convention, a dollar's worth of paint will protect as many dollars' worth of steel to-day as it ever did. Wooden structures can stand the ravages of weather and time without paint much better than steel, which deteriorates very rapidly if not properly covered. Paint is expensive to-day, but there is every reason to believe that it will be much more expensive a year from now, and with peace still far in the future it is sound economy to do all the necessary painting at present.

LABOR CONDITIONS AND WINTER WORK

ONE of the greatest handicaps under which the maintenance of way department has labored in endeavoring to retain an efficient force of employees has been the long-established practice of laying off many of the men late in the fall. A large proportion of the men thus discharged at the beginning of winter have very naturally endeavored to secure employment in other industries where more permanent work was to be had, and they have been lost to the railroads the following season. With the exception of a few relatively short intervals the roads have been able to overcome this continued migration of their men into other industries by recruiting sufficient forces of unskilled laborers each spring to enable them to complete their program of work during the six or seven months of the so-called summer working season. As a result of these conditions this alternate "hiring and firing" and the concentration of all heavy maintenance work in a few summer months has become so firmly established that it has been considered a necessary procedure by many maintenance officers.

With almost no warning, conditions are now changed, and this year the roads are going into the winter with large amounts of work unfinished; many of them are making every effort to hold all of the men they now have and are still engaged in renewing ties, laying rails and other more or less routine maintenance work. Thus under the strain of the present abnormal conditions the roads are being forced to conserve labor in a way which they should have done voluntarily years ago for economic reasons.

The somewhat radical changes in methods which must necessarily follow the carrying of large forces into the winter require careful consideration by foremen, supervisors and other maintenance officers. The program of work, the methods of its execution and the adoption of precautions which changed climatic conditions may require, must be considered carefully in order that the work may be done to the best advantage and without any serious disadvantages. If these steps are taken it will be found that a surprisingly large amount of productive work can be completed and the summer peak load reduced to that extent. This is not an unproven theory, for several roads have already made distinct progress in this direction during the last few years.

Under the present unsettled conditions existing in all industries and the mad scramble for men which was prevalent last summer and which will undoubtedly continue, it is not to be expected that a road will be successful in holding through the following summer all of the men which it retains this winter, but the percentage of experienced men which will remain in the gangs next year

will undoubtedly be larger than usual. More important at the present time than the retention of men for next summer's work is the ability to complete as much work as possible with the limited forces available.

MAINTENANCE OF CONCRETE STRUCTURES

THE gradual replacement of pile and frame trestles by permanent structures of steel and concrete, particularly the latter, has brought about a marked change in the duties of the bridge and building supervisor, and on some lines the term "master carpenter" has become somewhat anomalous. However, the fact that the structures under his care are classed as permanent does not reduce his responsibilities. Instead it has wrought a change in the nature of the problems he must solve. Even concrete structures occasionally develop faults that require correction. This has been true in a larger measure of culverts, arches and trestles, built in the pioneer days of concrete and reinforced construction, than of structures built since advanced theory and experience have served to standardize design and construction practice.

In the case of masonry structures the duties of the maintenance officer cover not only the repair of defective conditions, but the preparation of detailed reports on the faulty details he discovers, so that they may be avoided in subsequent designs. A certain proportion of the defects in concrete structures has been the result of poor materials, improper proportioning and loose practice in the mixing and placing of the concrete. However, the requirements of concrete materials and the details of workmanship have become so thoroughly standardized that there remains small excuse for failures from these causes. In consequence any difficulties encountered to-day are in many cases the result of faulty design or of failure to follow the design closely in the construction.

One detail which has given trouble and which is therefore brought to the attention of the bridge supervisor is the bearing of the reinforced concrete slabs on the piers or the caps of reinforced concrete pile bents. In some instances failure to recognize the need of an adequate expansion bearing for these slabs has resulted in a tendency to split the tops of the piers because the slabs were not free to contract in cold weather. In other cases the portion of the slab bearing on the pier has had a tendency to break away from the main body of the span by a crack starting at the edge of the bearing and running diagonally upward into the end face of the slab. In the case of long slabs the face of the pier may spall along the edge of the slab seat.

These represent cases where prevention is much better than cure. In fact, little can be done to remedy the failures, once they have occurred, other than to watch the structures closely and to put the slabs on falsework should conditions become dangerous. Prevention of such troubles lies partly in reinforcing to resist the temperature stresses but largely in providing a bearing that will allow a reasonably free movement of the slab with the changes of temperature. To accomplish this, steel plates and zinc sheets have been used. In some cases felt has served the purpose. Steel is objected to by some because it corrodes readily and because of its well-known power of bonding to the concrete. A method put into effect just recently, a direct result of the high cost of metal plates, was to coat the bearing with a layer of paraffin before applying the mortar bed for the slab. Spalling of the edges of the bridge seat can be avoided largely by chamfering the edges an inch or more so that the weight of the slab is applied some distance behind the face of the pier.

THE PRIORITY REGULATIONS AND MAINTENANCE MATERIALS

ALTHOUGH the engineering and maintenance of way departments are now beginning the preparation of plans for next season's work, any program which is made at this time is necessarily subject to much uncertainty because of inability to ascertain the amount of materials which will be available. The preparation of a schedule, therefore, resolves itself largely into a decision as to the relative importance of the improvements contemplated so that the materials available may be applied to the work in the order of its desirability.

The season now closing has seen much work left incomplete because of inability to secure materials or delay in their delivery. With the government entering the market on a continually increasing scale for a wide variety of steel and other products and the probability that these demands will increase rather than lessen as the war proceeds, it is evident that the supply of many materials will continue to be inadequate to meet all demands.

The problem of the country is to determine which needs are the most pressing and important to the welfare of the nation. This resulted a few months ago in the creation of the Priorities Committee. This body has now organized and outlined its method of procedure, as described in another column. Although much uncertainty still exists regarding the material situation as it affects the railways, the issuance of the instructions regarding methods of procedure in applying for priority orders and the rulings which have already been made by the committee have done much to remove this uncertainty.

Never before has the public been so fully aware of the importance of the railways to the welfare of the country as now. The Priorities Committee has shown its realization of the same fact by placing most of the applications for railway materials well up in class B, or secondary only to the orders of the government itself. Of necessity the committee is passing on each application on its individual merits and is differentiating between those which are desirable but not necessary at present and those which are essential to the maintenance and operation of the roads or to provide much needed increases in their capacity to handle the present government and commercial traffic. Because of this realization of the importance of the roads and the necessity of maintaining their efficiency unimpaired, the engineering and maintenance of way departments are practically assured that they will fare better than many other industries in securing the materials required for improvement work. They should, therefore, proceed with plans to maintain the properties under their charge to the standards which the government and the public now have a right to expect and to prepare their bills of materials at the earliest practicable date, accompanying the requisitions with concise statements of the reasons for these improvements. If the problem is handled in this manner present indications are that the railways will not have serious difficulty in securing those materials for which they can present good arguments. In view of the general shortage of supplies they should limit their requests to those projects on which it is important to proceed under present conditions. In many instances study will also show the possibility of substituting other materials for those which have previously been used. Even though this may require changes in standards which might not be advisable under normal conditions, such action will not only reduce the demand for certain materials, but will permit work to proceed which it might otherwise be necessary to discontinue.

LETTERS TO THE EDITOR

THE TRIALS OF A FOREMAN

PITTSBURGH, PA.

TO THE EDITOR:

I notice in recent issues of the *Railway Maintenance Engineer* that officers of different roads are advocating the raising of the track forces above the level of the common hobo. This is a good sign and too much cannot be said in favor of the suggestion. I have been a foreman in charge of extra gangs and of yard and section gangs on several eastern railroads for 15 years, and I have always claimed that if track work was placed on a level with similar positions outside of railway service and the same wages paid that positions of the same responsibility outside of track work are paying, there would be as many men in the track department as there are in other kinds of work. If the railroads would pay the same as other industries a foreman could get good men on almost any section and hold them, and this would be cheaper in the long run.

Another handicap is the fact that other employees look down on the track forces. If a section man flags a train he is abused by the train men. Another source of trouble is the fact that every station agent tries to lord it over the section foreman and order him around, when, ten chances to one, the foreman is a more intelligent man and of more importance to the company.

I like railroading, but the main drawback I see is the way the public and other employees look down on track men. This attitude must be changed. If the company has a foreman on a section whom the public cannot look up to, he should be discharged and a man put in his place who can command respect.

I would also suggest as an additional help that a foreman be granted a semi-annual pass for himself and family and that the same privilege be extended to the section laborers after they have worked a certain length of time on the section; that coal be furnished at cost to the foremen and men who have been in the service a certain length of time and that a foreman be given complete charge of his division, without allowing the agent to write to the roadmaster and supervisor about conditions on the foreman's section. The tendency for agents to order foremen around and have these men wait upon them as if they were their servants is the cause of a lot of trouble.

ONE FOREMAN.

PROHIBITION IN ARIZONA*

THE SOUTH WEST.

TO THE EDITOR:

Railroad officers are now confronted with some very complex problems in handling the immense volume of business now moving in a satisfactory manner. There are problems on the desert divisions of a railroad that are not thought of elsewhere. It is difficult to maintain a regular and efficient organization. Most of the men employed are on the desert because of some necessity or of some advantage that they hope to gain by a short residence. Nearly all hope that they will not remain long, and are looking forward to the time when they may be more pleasantly situated. Under such conditions, it is difficult to say what influence prohibition has had upon our working force in this locality. I believe,

*Received too late for inclusion in the series of discussions of the effect of prohibition legislation on maintenance forces, published in the last issue.

however, that until our international situation became unsettled less than a year ago, I could see quite an improvement in the personnel of our working force of all classes.

The division under my jurisdiction extends over two states, New Mexico and Arizona; the former wet, the latter dry. I have, therefore, had some opportunity to observe the conduct, deportment and efficiency of men working under these conditions. My bridge and water service gangs are used indiscriminately in both states as the work requires. When they are engaged in the wet state, our losses from the gangs have been heavier than when working in the dry. We, of course, keep a very strict surveillance over the outfit cars occupied by these men, and try to prohibit the use of liquor when they are located where they can get it, but in spite of our best care, they will get it and have it with them.

Conditions since this country has become involved in the European war have become so unsettled that it is impossible to say whether or not prohibition affects the efficiency of the working force. Men are unsettled. They are coming and going, hardly staying long enough for us to become acquainted with them. Men are being shipped in from the Pacific Coast daily. They are usually the poorer class of mechanics without tools, ambition, or any thought of staying permanently anywhere.

We depend entirely on Mexicans for our track labor. We get much better work out of them in the dry state than in the wet. In the latter, they seem to be somewhat more unsettled, and in some way are supplied with "booze." I cannot say that this is a regular thing, but a case will break out all too frequently. No such trouble exists under prohibition. Taking it altogether, we had commenced to notice a decided improvement in the working forces on the division because of prohibition legislation in Arizona before the present unsettled condition of the country at large was so apparent.

DIVISION OFFICER.

NEW BOOKS

Shape Book. 352 pages. 5 in. by 8 in. Bound in flexible leather. Published by the Carnegie Steel Company, Pittsburgh, Pa. Price \$1.

This is the sixth edition of the shape book of the Carnegie Steel Company and supersedes the fifth edition of two years ago, the revision being required because the progress in shipbuilding, automobile construction and the use of metal frames for windows, doors, etc., has called for the use of an increased number of sections. In addition to the sections used for structural steel work, there are a variety of sections for metal window frames, doors, etc., reinforcing bars for concrete work, standard sections for A. S. C. E. and A. R. A. rails and a number of special rail sections, with sections of angle bars and other rail joints. Some space is given to steel ties, fillers for frogs and reinforcing bars for switch rails. The last 85 pages are devoted to tables of weights and areas and an index of the section numbers.

Igenieria de Ferrocarriles. By Verne Leroy Havens. First edition. 357 pages. 4½ in. by 7 in. Illustrated. Bound in leatherette. Published by John Wiley & Sons, New York. Price \$3.50.

This book is written in Spanish and is intended for the use of the railroad engineers of Central and South America. The sub-title of this book, "The Theory and Practice of Railways from the Conception of the Idea to the Completion of the Project," expresses the purpose of this book, namely, to condense within the space

of 356 pages the fundamental principles of economic railway location, the methods of making railroad surveys, the management of field parties, and the principles of railway surveying. The last 100 pages are devoted to the usual tables found in a field book on railroad engineering, using the metric system. The book contains chapters covering such subjects as commercial considerations, estimates, reconnaissance, field party management, preliminary and location surveys, topography, railway economics, railway curve work, the adjustment and care of surveying instruments.

Index to Proceedings of the American Railway Engineering Association. 270 pages, 6 in. by 9½ in. Bound in morocco, cloth or paper. Published by the American Railway Engineering Association, 900 South Michigan avenue, Chicago. Price, morocco, \$3.50; cloth, \$2.50; paper, \$2.

The American Railway Engineering Association is now nearly 20 years old. Its proceedings have been published annually after each convention. A large amount of valuable information is contained in the reports of the committees, in the discussions of these reports on the floor of the convention and in the monographs which have been published from time to time. In all, nearly 20,000 pages of literature has been issued by the Association since its organization. The great mass of this data has demonstrated the necessity for one complete and general index of all of the proceedings. This index, which includes volumes 1 to 16 (1900-1915) inclusive, should be of much assistance to those having occasion to refer to the publications of this society. It is also a valuable bibliography of railway engineering practice for those who do not have complete files of the proceedings. The subject matter, which has been prepared under the direction of the Committee on Publications, is arranged alphabetically for ready reference, and is divided into subject and author indexes.

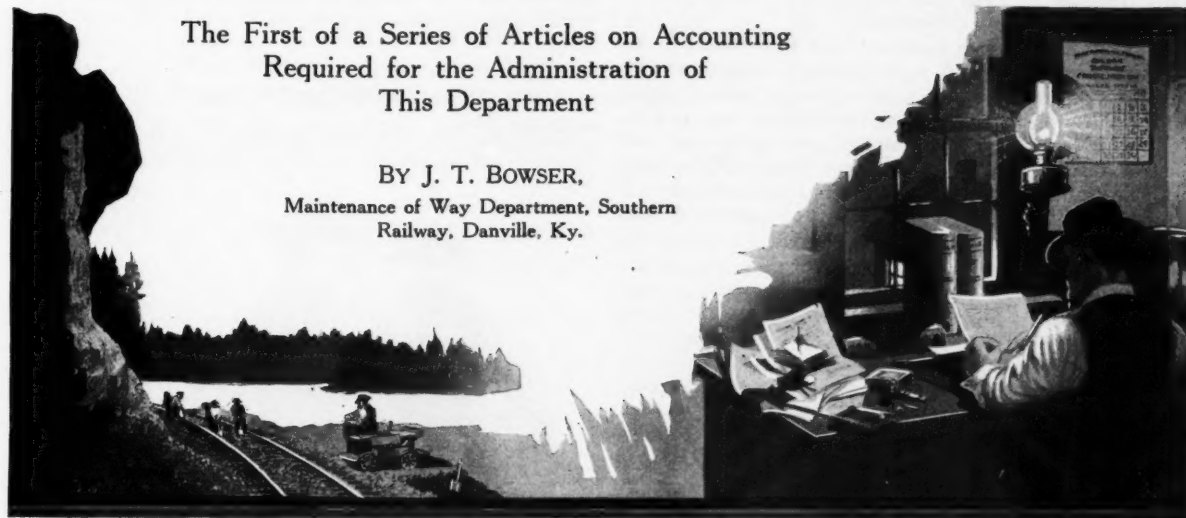
Wood and Other Organic Structural Materials. By Charles Henry Snow, dean of the School of Applied Sciences, New York University. 478 pages. Illustrated. 6 in. by 9 in. Bound in cloth. Published by McGraw-Hill Book Co., 239 West 39th St., New York. Price \$5.

Wood, unless treated alone, is usually associated in texts with the other common structural materials, steel, iron and masonry. In this book it is associated with certain other organic materials used in structures, namely, oils, paints, varnishes, glues and India rubber. The subject of wood covers 376 out of the 478 pages and the treatment may be said to comprise a general account of its physical properties. Strength, elasticity and other characteristics of special importance in the structural use of wood receive only minor treatment, a policy which the author justifies in the preface. The first 44 pages are given to an exposition of the physical makeup of wood. Following this, nearly 200 pages are devoted to cataloging the various species and their characteristics. Thirty-three pages cover the common structural properties and following these there is a chapter on decay. Fire hazards with respect to the use of wood in structures are also covered at some length with a discussion of fire prevention, fire resistance, protectives, etc. Marine wood borers and other wood destroying insects are given a much more full and complete treatment than is usually found in books on wood. Fifty pages are devoted to the protection of wood against decay and animal life by the well known methods. The last 100 pages of the book cover the physical properties and uses of the other organic materials mentioned above. The treatment is interesting and combines in one volume much information that is not often found outside of the more extended encyclopedias.

PREPARING MAINTENANCE OF WAY REPORTS

The First of a Series of Articles on Accounting
Required for the Administration of
This Department

BY J. T. BOWSER,
Maintenance of Way Department, Southern
Railway, Danville, Ky.



THE time was when about the only report required of a foreman in the maintenance of way department was the time roll from which the men were

paid for services performed, but that was back in the days when the management of railways was a comparatively simple affair, when efficiency in operation was not so highly developed, and when railroads were not closely supervised by numerous regulatory bodies. The increase in the size of the railroad systems, the demands for increased economy and efficiency in operation, and the requirements of the various commissions have changed those old-time conditions, so that the foreman of today must not only be a good man at his trade, but in fact, bookkeeping and ability to make intelligent reports are now almost fundamental requirements of his vocation. The average foreman does not, however, consider these particular requirements a part of his trade, but feels that he is burdened with what he considers in the bottom of his heart to be a lot of useless writing designed wholly to keep him awake at nights and to give the office something to write letters about. He feels

that his business is to maintain track or structures and that reports are a nuisance and something wholly

outside of the regular duties for which he is engaged.

As the average supervisor is in closer touch with the office, he usually understands somewhat more clearly

the necessity for these reports, but he also is inclined to agree with the foreman to a considerable extent on this subject. As a result he endeavors to see that the reports are made correctly and at the proper time, not from any clear realization of their necessity or benefit, but because they are required of him by his superiors.

The writer believes that if foremen and supervisors understand more clearly the reasons for which these reports are required, and the ends which they serve, they will become more clearly an integral part of the foreman's duties, and the "whys" being understood, the "hows" will be easier; the clerical work, which is often the worst sort of drudgery to the foreman, will become more interesting, and the reports consequently more accurate. This is what office men are after, and to this end a series of articles has been undertaken to explain these "whys."

For convenience of discussion, the reports will be divided under the heads given below, a separate article being devoted to each. The first of these articles

MOST FOREMEN REGARD THE REPORTS WHICH THEY ARE REQUIRED TO MAKE AS AN UNIMPORTANT PART OF THEIR WORK. MANY SUPERVISORS SHARE THIS BELIEF IN LARGE MEASURE. AS A RESULT MANY OF THE REPORTS ARE INDIFFERENTLY PREPARED; THEY FAIL TO GIVE THE INFORMATION DESIRED AND THEY GIVE RISE TO UNNECESSARY CORRESPONDENCE AND LOSS OF TIME ON THE PART OF ALL CONCERNED. BECAUSE OF THE ERRONEOUS IMPRESSION REGARDING THE IMPORTANCE OF THIS CLERICAL WORK WE HAVE ARRANGED FOR THE PUBLICATION OF A SERIES OF ARTICLES WHICH HAVE FOR THEIR PURPOSE THE EXPLANATION OF THE NECESSITY FOR THOSE REPORTS COMMONLY REQUIRED, AND THE OFFERING OF SUGGESTIONS FOR THE ACCURATE PREPARATION OF THE RECORDS. THESE ARTICLES HAVE BEEN PREPARED IN THE BELIEF THAT IF THE MEN MAKING THE REPORTS ORIGINALLY UNDERSTAND THEIR IMPORTANCE FULLY, THEY WILL GIVE THEIR PREPARATION THE ATTENTION THEY DESERVE AND MAKE THEM MORE NEARLY FULFILL THE PURPOSE FOR WHICH THEY ARE INTENDED AND CONSERVE THE TIME OF ALL CONCERNED.

THE AUTHOR OF THESE ARTICLES IS IN CHARGE OF THE OFFICE OF ENGINEER MAINTENANCE OF WAY OF THE QUEEN & CRESCENT LINES OF THE SOUTHERN. IN THIS POSITION HE HAS NOT ONLY BEEN CONFRONTED DIRECTLY WITH THE PROBLEM OF ANALYZING AND USING THE REPORTS SENT TO THIS OFFICE BY THE FOREMEN AND SUPERVISORS, BUT HE HAS ALSO GIVEN CONSIDERABLE TIME TO THE TRAINING OF THESE MEN ALONG THE LINES OUTLINED IN THE ARTICLES.

Time Rolls and Daily Labor Reports.
Distribution of Expenditures for Labor and Material.
Material Reports.
Special Reports.
Miscellaneous Reports.
Reports Required of Supervisors.

In general, the prime factors of all reports are accuracy and promptness. A report must be accurate or it is of little or no value. In fact, a wrong report is likely to cause trouble by furnishing inaccurate information from which incorrect conclusions may be drawn. It must be made promptly at the time required or it may disarrange an important and highly complicated schedule of office work, or the company may be subjected to a loss because necessary information is not at hand at the right time. Foremen should realize that their reports are the primary source from which many important records are compiled, and the foundation on which the whole structure of maintenance of way accounts is built, and that if the structure is to be stable and is to stand the test of operation and investigation, the foundation must be well laid.

It is important, then, that an accurate *daily* record be kept by the foreman, entries being made at the time and on the ground as the work is performed, and while the information to be recorded is fresh in mind. Matters left to the memory often end in guess work. Who can say, when making up his monthly reports, that he has never had thoughts something like this: "Now where *did* we work on the 8th? Let's see, that was on Thursday. I *believe* we put in ties that day." Or, "I can't balance the thing; I'll just charge that difference to track maintenance. They will never know the difference in the office."

Reports are not simply forms of red tape, nor are they designed wholly to give the office something to write letters about, but each is intended to fill some pressing need for certain information, and in its own way affects vitally the efficient and economic operation of the railroad. Accounting reports, that is, pay rolls and labor and material distributions, are designed to supply figures from which operating officers may judge the degree to which value is received for money expended, to furnish figures for the guidance of the officers responsible for the finances of the road, and to form the foundation on which the reports required by the Interstate Commerce Commission and the state commissions are based.

Special reports, such as those concerning accidents, fires, stock killed, personal injuries, etc., are designed to serve as permanent records of the knowledge of eye witnesses, or of other important information concerning each case, made at the time of the occurrence while the facts are clear and uninfluenced by later conditions, and they often serve to protect the railroad from unjust or excessive claims for damage. They also serve as a basis for measures to prevent similar occurrences.

Each of the miscellaneous reports has its own particular use and in some way serves to assist in efficient oper-

ation or in the protection of the railroad property. Each of these classes of reports will be treated in detail in subsequent articles. It is hoped that by showing to the man in the field the point of view of the man in the office, the compilation of accurate reports may be made easier for both.

TIME ROLLS AND DAILY LABOR REPORTS

Since the time roll may be said to be the foundation of the most important of all the reports made by main-



"THE FOREMAN WHO WISHES TO AVOID CORRESPONDENCE"

tenance of way department employees, it is fitting that it should be the first to be considered. It may be best discussed under two heads, the daily report of time, and the monthly time book or summary. While the daily time report is not required on some roads, it is for many reasons quite important and is generally in use. On those roads where such reports are required, they constitute a record of the time made by the various gangs, which is available for reference in advance of the receipt of the monthly report or monthly time book. In some cases the time is posted from these reports into an office time book which, to secure greater accuracy, is checked against the monthly time book, which some roads use in addition to the daily time report, when the monthly book is received from the foreman at the close of the month or other payroll period. This office book, or the daily reports themselves, also serve as a record of the names and locations of all employees in the service at the moment, which is available at all times. They further serve to permit the advance preparations of payrolls so far as the names are concerned, which is often necessary on account of the limited time between the date on which the books are received from the foremen and the date on which the completed rolls must be forwarded to the accounting offices. For the latter reason foremen are sometimes required to place the names of their men on the daily report in the alphabetical order of the first letter in the surname, and to keep the names in the same order on all reports, as this is of considerable assistance to the office men in posting the office book and in the compilation of the payroll. The record taken from the daily reports serves also as a check against the time reported by the foreman on the applications for discharge checks and thus prevents loss through over-payments which might be made on account of mistakes on these applications.

With this advance information in the office, the foreman who wishes to avoid correspondence and questions concerning time reports is much more likely to keep an accurate time book, and since the daily report must be made and forwarded immediately on the close of each day's work, the foreman who is inclined toward dishonest practices has less leisure to figure out an improper allowance of time. Then, too, he will be less inclined to undertake such a thing when he feels that



"NOW WHERE DID WE WORK ON THE EIGHTH?"

there is any likelihood that a difference between the daily report and the time book will bring his dishonesty to light. In case of the loss or destruction of the monthly time book, which sometimes occurs through accident or malice, a new book may be constructed from the daily records in the office and nothing is left to guess work.

THE MONTHLY TIME BOOK

Since the methods of accounting in use by railroads in general require a monthly distribution of labor, the time book usually includes all the time made during the month. For various reasons, such as local laws requiring the payment of wages more often than once each month, or labor conditions, the time on these books is often closed and reported and a payroll prepared twice a month or even as often as once each week, though the time book remains a monthly report so far as the distribution is concerned.

The employee has a right to expect full payment for every hour's labor performed by him, and the railroad

must be handled, it amounts to a great deal in the aggregate.

Nearly all roads require that the time be posted daily and that the total time allowed each day be set down on the bottom line of the book, the sum of these totals balancing with the sum of the total time allowed each man for the entire period. In the interest of accuracy this is a very important requirement, for if these totals are the same, the foreman may be sure that the total time allowed each man is absolutely correct if his book has been posted correctly. This method of balancing is illustrated in Fig. 1.

THE CORRECTION OF ERRORS

If an error in the time allowed is discovered by the foreman, or is called to his attention by the office or by a time checker, he should under no condition undertake, on his own responsibility, to allow time to make up a shortage or to make a deduction to cover an over-allowance, more especially after the report, either daily or monthly, has been forwarded to the office. He should rather report his discovery to the office immediately and ask for instructions. It is much better for him to receive a reprimand for carelessness than to have his motive questioned by some one who might not understand, even if one is entirely honest in his intentions. Omitted time and over-payments must show as such, for one never knows in what the time record may become involved. The time book is often used as evidence in suits for wages and in claims for damages, and must therefore be absolutely correct in the first instance, or a clear record of errors and the steps taken to correct them must be shown as such, and must be thoroughly understood by some one in authority. Otherwise the time book may prove valueless as testimony

CHECK ROLL

Month of _____ 191__

	NAME	OCCUPATION				Month of _____ 191__												Total Days	Rate per Day or Month	AMOUNT	Amt. to be Deducted for Reimburse		
			1	2	3	19	20	21	22	23	24	25	26	27	28	29	30					31	
1	Robinson Jas. H.	Foreman	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	30				
2	Henry Thos. R.	Laborer	/	/	X	/	/	X	X	X	/	/	/	/	/	/	/	/	23				
3	George William T.	"	X	/	X	/	/	X	X	X	/	/	/	/	/	/	/	/	22				
4	Bruce Jas. W.	"	X	/	X	/	/	X	X	X	/	/	/	/	/	/	/	/	23				
5																							
6																							
19																							
30																							
Total days, including Foreman's time			2	4	1	4	4	1	1	4	4	4	4	4	4	4	4	4	98				

I certify that the men above named have been employed as specified in the service of this road.

Examined and found correct.

Supervisor.

FIG. 1. A TYPICAL MONTHLY TIME ROLL

has an equal right to expect that no employee be paid for a single hour in excess. Therefore, accuracy is the prime consideration in the preparation of these reports. An accurate and clearly written time book will save both the foreman and the office a great deal of time and correspondence, for while an error or two or one poorly written time book may not cause the office much delay, when this is multiplied by the hundreds of books which

when a case may hinge upon it and, further than this, it may reflect unfavorably on other evidence.

On some roads the rules against the correction of errors by foremen without the proper authority to do so are carried to the point of having a sealed carbon underneath the time sheet, which registers every mark made thereon, and which cannot be erased or changed without breaking the sealed sheets. In these books

errors are never corrected by the foremen, but are explained by them, if the foremen detect them, in a space provided for this purpose on another sheet in the time book.

To prevent mistakes in the allowance of time, nearly all roads require their foremen to carry the time books and to enter the time thereon at the hour it is made. In many cases the book must be posted as many as four

within a limited time, and this payment cannot therefore be permitted to take the regular channel through the payroll to the regular pay day. Discharge checks must then be issued in such instances. For the protection of the office issuing the discharge checks, some form of application is required of the foreman. It is important, of course, that these be made out promptly and that they show correctly the time allowed on the time

TIME ROLL. Section No. 5 Pay at Rio										2nd Division. Month of July 1917																			
NAME	Occupation	1	2	3	4	5	6	7	8	9	22	23	24	25	26	27	28	29	30	31	TOTAL TIME IN DAYS	Rate of Pay Per Hour, Day or Month	AMOUNT EARNED	DEDUCTIONS	AMOUNT DUE	REMARKS			
Brown John	Laborer	5	5	4	X	X	X	5																					
TOTAL																													
<p>The person checking this book will sign his initials and Time of Inspection in spaces below total line.</p>																									<p>INSTRUCTIONS TO FOREMEN. At 6 p. m., or as soon as day's work is completed the foreman will insert a large X in these spaces, corner to corner.</p>				

FIG. 2. ANOTHER FORM OF TIME ROLL

times each day, and all spaces in which no time is allowed must be marked with an "X." (Fig. 2.) This method, combined with the sealed carbon method, not only secures almost absolute accuracy, but also discourages dishonest reports of time, since the foreman who undertakes to allow time which is not actually made must not only plan his theft very minutely beforehand, but must also follow his plan with the utmost care after it is undertaken or he will make some error that will disclose his intentions. The chance that a slip might be made which will cause investigation no doubt often deters a foolish youngster or a more criminal older man from undertaking anything of this nature.

However, as has been outlined above, these systems and the checking of the time books in the field by the supervisors or others authorized to do so are not designed solely to detect fraud, for fraud or attempts at fraud are not common among the class of men from which the foremen are chosen, but they are also designed to insure care and accuracy in the preparation of time reports. The honest foreman, far from feeling hurt or impatient at these safeguards, should see their value and welcome them, for through them he is held up to the mark in his endeavor to turn in an absolutely accurate book.

Such special reports of overtime as are required on some roads are designed to prevent employees being called out, or held over regular working hours unnecessarily, and thus to prevent the railroad being put to an unnecessary expense. A foreman acting in entire good faith may require his men to work overtime, when by a little thought it may be avoided, and when he knows that he must give a good reason for the overtime when he reports it, he is much more likely to do the necessary thinking in order to avoid being questioned. These reports serve also to check the calling out of men unnecessarily by dispatches, operators, trainmen, or others, since they are often questioned as to the necessity of the call when the reports reach the office.

DISCHARGE CHECKS, DEDUCTIONS AND GARNISHMENTS

The laws of many states provide that employees discharged from the service or even those leaving of their own accord may demand the payment of wages due

book, or the railroad may become involved in a costly suit, or the foreman may be subjected to loss through an over-payment. Written orders for deductions from wages are required to protect the railroad company from claims by an employee who may deny the justice of the deduction, and to protect the employee from deductions for accounts which he does not owe or which for some reason he does not recognize.

Reports of wages due employees, which have not already been reported on the time book for the payroll, are required generally in garnishment cases, even though the foreman may have reported the time by daily report, as such a special report checks and is checked by the daily time report, and the chance of error is reduced to the minimum. Further, the foreman usually has the record of deductions to be made, and since the railroad company must turn over to the court the amount reported due, up to the amount of the garnishment or assignment plus the costs, the amount reported must be the actual amount due or some one loses.

To sum up the whole question of time reports into one paragraph—since the foreman's time reports are the basis from which the payrolls and pay checks are made, and since both the employer and the employee have a right to expect value received for wages and labor, and since these reports must stand the acid test of the law, the greatest possible accuracy must be guaranteed. This makes necessary the many reports and systems to insure careful checking, which may at first glance seem superfluous to the average foreman.

A NEW MANGANESE CROSSING

THE common location of trouble with manganese crossings is at the corners where the two flange-ways intersect. Here cracks frequently develop, as a result of bending moments set up under wheel loadings, superinduced by the reduction in the effective depth of the crossing structure at these grooves. This is especially true of 90 deg. crossings. To overcome this difficulty a new type of manganese crossing has been developed, which is built up of a number of units cast separately, the joints between these units coming in the grooves where these cracks tend to form. In conse-

quence the crossings may be said to be articulated and the parts on either side of a flangeway can assume a normal movement under the passage of trains without setting up stresses at the points of weakness in the grooves.

The drawing shows a crossing of this type. It consists of four U-shaped side pieces, or interior arms, each forming the tread, flangeway and guard rail of one of the four sides of the crossing, as well as the guard portion of two of the exterior arms. In addition there are four corner pieces, forming the tread portions of the exterior arms. These eight parts are designed to fit into each other so as to form a complete crossing and are held together by bolts as shown in the cross sections in the drawing with the addition of knees to connect the pieces at the corners. The joints between the four side pieces are mitred and terminate at the intersection of the grooves, while the joint between each corner piece and the exterior arm of each side piece comes in the flangeway and has a dovetail and mortise shape. That is, the arm of the side piece is provided with a groove to receive a corresponding projection on the side of the corner piece so that a strong connection is formed when the two are brought together.

SECURES FLEXIBILITY

By building the crossing in units, with the joints coming in the grooves, it is given a certain degree of flexibility at the corners so that a definite yielding takes place in the part of the crossing coming under a wheel with respect to the parts beyond the groove. There is no possibility of the formation of cracks because the



ONE OF THE EARLY INSTALLATIONS

cracks are already there in the form of definite joints, yet the shape of the joints is such that the crossing forms a compact, united structure.

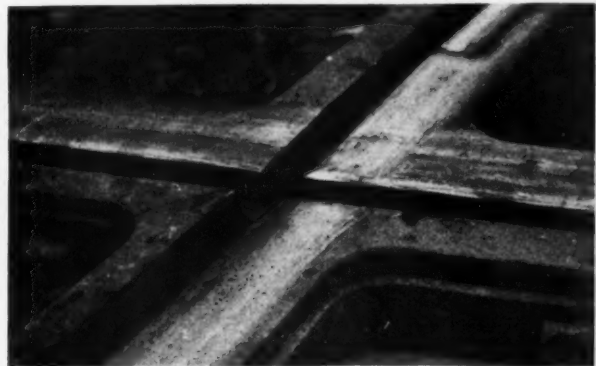
A number of other advantages are claimed for this arrangement. Owing to the fact that the exterior arms are divided, with the tread portion separate from the guard or wing, the connection to the track rail is simplified since the rail may be camped rigidly between the two parts of the arm. Being cast in two parts, the two fishing surfaces necessary to form the joints are readily finished with the grinding tools and it is not necessary to resort to a special angle bar or joint for one side of the rail, as is done in the usual type of manganese crossing.

Since the crossing consists of a number of separate parts the individual castings are considerably smaller

than in the usual type where the crossing usually consists of not more than two or four parts. This fact is of material advantage in securing sound castings and a more thorough treatment of the metal.

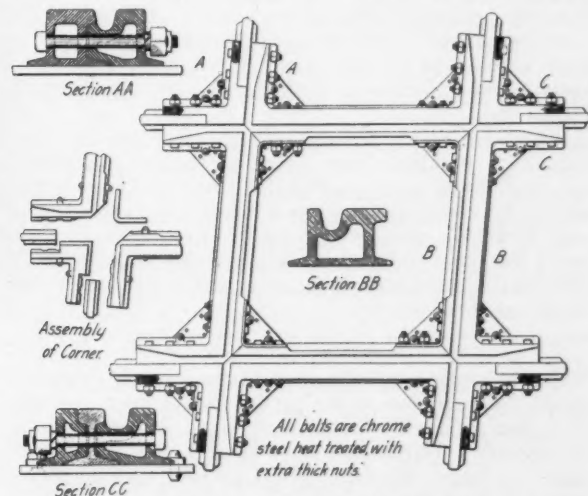
SUBJECTED TO SEVERE SERVICE

Crossings of this type have been in service on a number of railroads in various parts of the country for some



CLOSE UP VIEW OF AN INTERSECTION AFTER TEN MONTHS' SERVICE UNDER HEAVY TRAFFIC

time. One at the crossing of the Baltimore & Ohio and the New York Central main line at Painesville, Ohio, was installed in June, 1915. The traffic on both lines is very heavy and after a service test of more than two years another of these crossings was installed in one of the other intersections at this point in July, 1917. Another crossing having an angle of 78 deg. 58 min. has been in service at the Junction of the Hocking Valley and the Baltimore & Ohio at Fostoria, Ohio, since November, 1916; another at the crossing of the westbound main track of the Erie and the westbound freight track of the Pennsylvania Lines at Cleveland was installed



DETAILS OF A BALKWILL CROSSING

in February, 1917. This has an angle of 68 deg. 47 min. and its condition after 10 months' service is shown in one of the photographs.

A crossing of this type manufactured by the Pettibone-Mulliken Company, Chicago, has been in use at the crossing of one of the Illinois Central main tracks and the Chicago & Western Indiana southbound passenger track at Burnside (Chicago) since September, 1916. The

angle is 87 deg. 20 min. Other crossings of this type manufactured by this company are in service at the crossing of the St. Charles Air Line with the Rock Island and the New York Central in Chicago; at the crossing of the Elgin, Joliet & Eastern and the Chicago, Milwaukee & St. Paul at Spaulding, Ill.; and at the crossing of the Rock Island with the Santa Fe and the Alton at Joliet, all of these being points of heavy traffic

for the intersection lines and with angles closely approaching 90 deg. They have also been installed on the Union Pacific and the Southern Pacific. This design of crossing has been developed by Stephen Balkwill and the patents are owned by the Balkwill Manganese Crossing Company, Cleveland, Ohio. Crossings are being manufactured under license by Pettibone-Mulliken Company, Chicago.

The Bonus System for Maintenance Work*

BY W. C. NISBET

THE setting of correct standard times for the different operations is the most important and also the most difficult feature in connection with the installation of the standard time and bonus system. If the standard times are so easy that nearly every gang can attain or excel them, bonus will be paid with little or no return. Further, there is little incentive to improve if 100 per cent can be made without particular effort. If the standard times are so difficult to attain that all gangs stand at 70 per cent or 80 per cent, the amount of bonus received is so little that again there is little incentive, and as a result the men become discouraged and do not try to attain the standards.

The foregoing warning does not mean that it is not possible to establish a fair and satisfactory set of standards, but it does mean that care and time must be taken and the best talent available assigned to the work. An experienced division engineer might be a suitable person to place in charge with two or three capable assistants, one of them a roadmaster. Possibly the help of an experienced time setter might be had.

The man in charge should pass on all the proposed standards and should make sufficient time studies himself to be absolutely certain that the times set represent true 100 per cent performances. Simply to approve the recommendations without this precaution would be to court trouble, as it is bad practice to change a standard time unless a different method of doing the work is established.

Another necessity for having competent help in establishing the standard times is that the desired or standard practice should be defined at this time and the schedule of operations comprising the standard time should coincide with this standard practice. In other words, for every job the method of work which should be regularly followed must be decided upon and the time studies made on this method.

HOW TIME STUDIES ARE MADE

A standard time is the time formally set as sufficient to do a certain job in the established manner, working at as fast a pace as may be maintained without harm to the worker. This time will be shorter than the average time but longer than the record performance of picked men for short periods.

The method of determining such standard times is by time-studying each operation with a watch.* For many jobs an ordinary watch is satisfactory; for others in which the operation timed takes but a few seconds a stop watch is convenient. The Swiss decimal timers costing about \$9 are best. They can be stopped or started without changing the running time record and

show the time for 30 min. The decimal feature is a convenience.

In starting to prepare a set of standard times a list should be made of the principal operations in track work and the subdivisions of each into classes for which separate time should be assigned. This list will naturally be changed from time to time. In some cases more subdivisions will be found necessary than in others.

A few examples are given below:

1. Put in Ties.
 - a—In stone ballast.
 - b—In gravel or cinder ballast.
 - b-1—Main track.
 - b-2—Side track.

Under each heading a time will be ascertained and set with variations for the amount of ballast in the track, i. e., for full ballast section, half full and empty.

2. Lay Rail.
 - a—Replacing single rail.
 - b—Laying continuous stretches.
 - b-1—85-lb. and up to 100-lb. rail.
 - b-2—Less than 85-lb. rail.

If different methods of laying are permitted which result in different speeds, a time for each will be needed. For laying rail the standard time should be in hours per rail laid.

3. Surface Track.
 - a—Stone ballast.
 - a-1—Low joint surfacing.
 - a-2—Continuous raise.
 - b—Gravel or cinder ballast.
 - b-1—Low joint surfacing.
 - b-2—Continuous raise main track.
 - b-2-a—Continuous raise side track.

As in the case of putting in ties, a variation is set for each sub-heading, depending on whether there is a full or half-full ballast section or if the space between the ties is empty. Under "Surfacing" the standard time should be in decimals of an hour per end of one tie surfaced.

STUDIES SHOULD COVER SEVERAL DIVISIONS

Other operations may be listed in the same way and time studies can then be started, the different men assigned to the work being sent out separately to time-study whatever operations are in progress in the territory where they are assigned. It is well to take different divisions, as the track men on some will be found much more diligent than on others. Further, by this process different methods will be found, some of which may prove easier and better than the usual ones and can be made standard to good advantage.

The time-study men should take pains to note all the conditions which may affect the work and enter these on the time-study blank, together with the list of opera-

*This is the third of a series of articles on the subject. The first article appeared in the October issue, page 310; the second was published in the November issue, page 347. Others will follow in succeeding numbers.

tions and the time of each. A suggested form is given below, but special notes as to other conditions observed should be made fully.

..... Railroad.
Maintenance of Way Department.
Time Study on
Made on Div. Sub-div. Sec. at
Date Size of gang Men Foremen
Weather Study made by
Check quality of workmanship as to,
Average.
Better than average.
Poorer than average.
Check speed of performance as to,
Average.
Better than average.
Poorer than average.
Note interruptions or other idle time.
Give recommendations for Standard method and proper size of gang.
Make list of operations show the method pursued plainly.

Operation No.	Items of work	Time study No. 1	Do No. 2	Do No. 3	Do No. 4	Proper standard time based on those studies
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It is necessary to have several time studies on each operation before setting a standard time as an astonishing variation in time will be found for the same operation performed under the same conditions by different gangs and good judgment as well as plenty of information is needed to set the standard correctly.

All the time study work done will be found to be very valuable in locating poor performances and indicating the cause. Improved performances on many gangs will result if the information developed is made use of.

TIME STUDIES ON INSTALLING TIES

Below are given some examples of studies made on installing cross-ties in gravel ballast in main track with full ballast section. The established method was to dig out the ballast from between the ties, drive the old tie sidewise into this space and then pull it out from under the rails with picks. Jacking up the track was not allowed. The time given is for one man, although some of the operations were performed by two men working together. In the last case the elapsed time is multiplied by two and any lost time is deducted.

Operation No.	Item of Work	First Time Study	Second Time Study	Third Time Study
		Min.	Min.	Min.
1.	Dig out ballast.....	7	11	10
2.	Draw 4 spikes.....	3	1	2
3.	Remove old tie.....	4	3	2
4.	Prepare bed.....	2	3	2
5.	Place new tie.....	2	1	1
6.	Drive 4 spikes.....	4	4	5
7.	Fill in and tamp.....	10	8	6
		32	31	28
	Foreman's supervision			
	1/10 of above (gang of 10 men)	3	3	3
		35	34	31

Three such time studies are not sufficient to decide upon a proper standard even though the totals do not vary materially.

Note that the time for operation No. 1 is 50 per cent more in time study No. 2 and 3 than in No. 1, also that in operation No. 7 there is a marked variation.

Enough studies should be made so that it is thoroughly established what a representative 100 per cent perform-

ance is. The standard should finally be set by carrying out each operation into a final column headed "Proposed Standard Time" and then taking the total.

THE FOREMAN'S SUPERVISION

In the time study given the time of the foreman was included, it being assumed that in each case the gang had 10 men and that 1-10 of his supervision was applied to the individual represented in the time study. There are other ways of handling this matter, but that described is convenient and allows time charged for each job to be compared with the standard. In setting standards it seems proper to use uniformly the figure 1-10 of the foreman's time for supervision even if the gang is not always ten, because in practice if a foreman has 20 men he usually has an assistant; if he has 5 men he does or is supposed to do some work himself, and if he has but two or three men he is generally expected to work like the men in the gang.

TIME STUDIES ON LAYING RAIL

On jobs where a large gang works together it is necessary to separate the different operations to get an intelligent study. It is assumed that the rail had been distributed previously with the necessary fittings and the method used was to place the new rail on its side on the other ends of ties for a considerable distance, then to throw out the old rail in a string over the new rail, and then to tilt the new rail onto its base which falls into position. Then follows the usual placing of the angle bars, the bolting and spiking. As much adzing was done prior to the work as possible and the remainder was done following the throwing out of the old rail.

Just ahead of the men turning in the new rail three or four men hastily space one end of the ties necessary to make room for the depending flanges of the splice bars. In setting up the new rail the tongmen are counted and their time noted per rail for the whole number they set up. One man tipping the rail onto its side is counted with the tongmen. One man is sent ahead, drawing spikes. He is timed for two or three rail lengths, the spikes counted and the timing repeated. The number of men turning out the old rail is noted, and also the number of rails they turn out, and their time.

All this information can generally be secured conveniently for rails of uniform length and the standard time set per rail length. This is a better figure than "per foot" because it takes just as long to lay short lengths as full-length rails.

The adzing is more variable than any other item, but an average amount will have to be assumed and time provided to do it. Tie spacing for depending flanges may be included in the rail-laying schedule, but it seems better to have a separate standard time per tie moved and keep the time of the men doing the work. The foreman will then include in his daily report not only the number of rails laid and the time consumed, but also the number of ties spaced and the hours of labor doing this. One man can tilt 100-lb. rails in with another to help get the proper expansion. Their time is easily taken.

Applying each pair of angle bars may be the work of two men, one going ahead and putting on the bars and placing two bolts. Later another gang comes up, full-bolting. These can be timed individually for certain joints, or one man may be kept at the job until all bolts are in.

A wide variation in time will be noted in applying angle bars, as working fast is more laborious than it appears. On the other hand, a man can loaf without showing it.

The writer has observed cases where it took 15 to 17

min. per six-hole joint to place the bars and bolts and tighten all the bolts. In another gang a young Italian put on a pair of bars and tightened the six bolts thoroughly in 9 min. One of his compatriots repeated the performance in 7 min., but was glad to rest afterward. The men spiking can be timed for a rail length and the time noted for a certain number of spikes. The time to make a connection can be noted, also the time to open track, and the number of men who are required to be idle in each case counted. After arriving at a normal figure for these the product can be taken as allowable lost time per connection, and the foreman should add to his report the number of connections made.

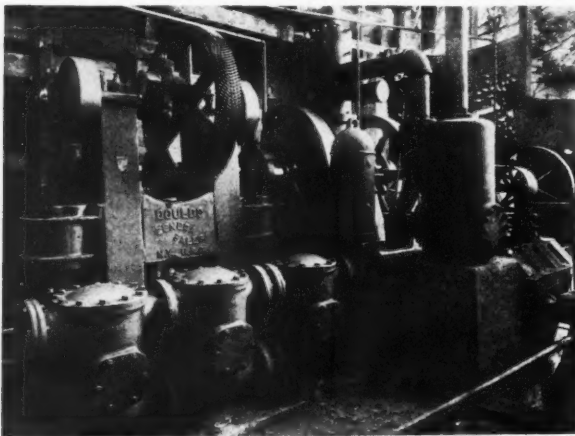
The standard time he will be allowed for the rail he laid will then have added a certain additional amount, depending on the number of connections made. There may also be a standard time for laying rail through switches or street crossings. Time for flagging and the water boy will be included in the regular standard.

In setting the standard times for each operation in laying rail the same method as described before should be followed, i. e., a reasonable 100 per cent performance decided upon and the total taken. Each operation may well be considered as to the following:

1. Is the operation necessary, i. e., could it not be omitted or abridged?
2. Is it done in the best method?
3. Is it done in the quickest time possible?

WATER STATION PUMPING RECORDS

IN parts of the country where electric current is not available for driving power pumps to supply railroad pumping stations, the oil-engine-driven unit is gradually supplanting the steam pumps which formerly were used exclusively for this service. The photographs show two installations of this kind on the Boston & Albany consisting of single acting triplex plunger pumps made by the Goulds Manufacturing Company of Seneca Falls,

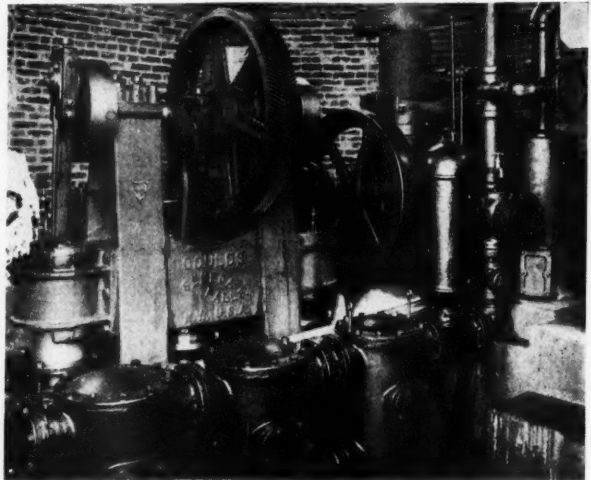


THE INSTALLATION AT NIVERVILLE, N. Y.

N. Y., operated by Crescent oil engines manufactured by the Samuel L. Moore & Sons Corporation of Elizabethport, N. J.

One of these shows one of two units located at Niverville, N. Y., each of which consists of a 12-in. by 10-in. Goulds pump with helical gearing and extended pinion shaft for direct connection to a 30-hp. Crescent engine running at 400 r.p.m. The source of supply is a spring located directly beneath the pump house, from which water is taken through an 8-in. pipe with a suction lift

of 12 ft. and delivered through 6-in. pipe to the storage tanks which are seven in number, one holding 63,000 gal. and the others having a capacity of 12,000 gal. each. The largest of these and the one most frequently used is placed 20 ft. above the ground at a distance of 1,200 ft. from the pumps, and at a total elevation of 42 ft. above the spring. The entire system is so arranged that the smaller tanks being at a lower elevation are filled first, automatic valves being provided which close when the water reaches a certain level so that the entire discharge



PUMP AND ENGINE AT MELLENVILLE, N. Y.

of the pump is delivered to the large tank when the smaller ones are filled. The other equipment at this station comprises a 3-in. by 4-in. Goulds air compressor driven by a belt from the engine, which maintains a pressure of 115 lb. in two compression tanks used in starting the engine, and two tanks for storing crude oil for the engines. The pumps are in operation approximately seven hours per day, and replace two 12-in. by 8-in. by 12-in. single-cylinder direct-acting steam pumps.

At the time that this pump was installed an 11-hr. test was run, in the course of which 346,500 gal. of water was pumped, or an average of 525 gal. per min. The fuel and lubricating oil consumed amounted to 52 gal. of crude oil, 2 gal. of kerosene oil and 5 gal. of gas engine oil. The total cost of operating, including the engineer's time, was \$0.016 per 1,000 gal. pumped. The engine was running at a speed of 371 r.p.m. and the pressure at the pump was 60 lb. per sq. in. The suction lift was 12 ft.

The pump has been in service for over four years with satisfactory results. During the month of August, 1917, 5,859,000 gal. of water was pumped with 558 gal. of crude oil and the cost per 1,000 gal. was \$0.019. The pump is run an average of 12 hr. per day.

The other photograph shows the installation at Mellenville, N. Y. In this plant is a 10-in. by 10-in. Goulds pump fitted with helical gearing and an extended pinion shaft with a clutch coupling for direct connection to a 20-hp. Crescent engine, running at 425 r.p.m., designed to deliver 428 gal. per min. at 42 r.p.m. Here, water is taken from a creek about 50 ft. distant from the pump house, the total lift including pipe friction being 15 ft. and delivered to a 63,000-gal. tank located directly above the pump at a height of 20 ft. No test for economy has yet been run on this unit, but the general operating results correspond closely to those secured at Niverville.



KEEPING THE LINE OPEN IN WINTER

The Importance of Preparedness
in Combating Snow and Ice—De-
partmental Co-operation Essential

WITH the ar-
rival of win-
ter this year
the maintenance forces
on roads in northern
United States and Can-
ada face the problem
of keeping the line
open short-handed. The
maintenance of an un-

interrupted traffic on such lines during the winter months is at best a difficult problem and with the handicap of depleted forces the situation demands special study. The following article deals with preparedness and the necessity of co-operation between departments.

THE PROBLEM OF SNOW REMOVAL

By J. W. POWERS,

Supervisor, New York Central, Oswego, N. Y.

The task of keeping tracks clear of snow and ice is one of great importance. First, because it is so necessary; and, secondly, because it is such an important item of expense. This is particularly true in the northern states and in Canada, where the severe weather during the winter months makes it necessary that every department of the railway service be in shape to battle with the elements successfully.

The winter of 1916 was the most severe experienced in northern New York in several years. In certain localities, the thermometer reached 53 deg. below zero for two different days and 45 deg. on six consecutive days. Snow drifted into cuts to depths of from 15 to 25 ft. at some points and ice 4 ft. thick formed in the Oswegatchie River at Ogdensburg.

From the preceding it is evident that all means at our command for snow removal must be employed. While much difficulty is experienced with heavy falls of snow, that which causes the most trouble is the drifting snow which is continually encountered in this section.

THE TRACKS ARE PREPARED IN ADVANCE

To cope successfully with snow and ice, one of the first things to do is to prepare the tracks for the safe running of wing-plows and flangers. As our plows are 16 ft. wide when the wings are open, it is necessary that all obstructions be at least 8 ft. 6 in. from the center of the track and at a greater distance on the low sides of curves. Great care is exercised at grade crossings to have all material level with the rail and on the inside of curves somewhat lower. At all points where sidetracks leave the main track, on the inside of curves, it is necessary to have the sidetracks low enough to clear the point of the plow or a derailment may occur. All bridges, switch stands, mail cranes, station platforms and other obstructions of any kind should be made to clear the wing of the plow if possible. At bridges, wooden guard rails should be kept level with the top of

rail. If it were possible to do so, it would be desirable to have all obstructions clear of plows with wings out, as every obstruction is an element of danger. Flanger blades should be set to cut as low as possible. If ties will not clear the flanger blades because they are rail cut, they should be adzed and all obstructions that will not clear the wings and the flanger blades should be protected by signs.

An endeavor is made to secure the proper clearance for snow equipment on sidings as well as our main tracks, as the plows and levelers are also used on these. On sections where trouble is experienced from snow blockades in cuts, they are protected by permanent or portable snow fences. Where portable snow fences are used, they are set up in proper position and staked down before the ground becomes frozen. A portion of the ballast is removed from between all switch ties, commencing one tie ahead of point and extending to the heel.

Many years of experience and observation has made it possible to determine the number and kind of plows necessary and where they should be located to secure the desired results. Both the single and double track Russell elevator wing plows are used with flangers and wings operated by air, as well as flanger cars before the snow becomes too deep. Rotary plows are located where needed.

RECRUITING THE EXTRA FORCES

To secure extra men when needed, the territories along the line are canvassed to determine where it is possible to obtain them. By so doing it has always been possible to secure sufficient help from outlying sections to remove snow in large yards when it is impossible to obtain sufficient help locally.

A local telephone system at important points enables the railway officers to communicate readily with the foremen and when necessary men can be changed from one location to another and thus place them where they are most needed. All the section foremen are furnished with a sufficient quantity of snow shovels, brooms and salt and are instructed to detail men both day and night if necessary, and they are allowed to employ extra men when in the judgment of the supervisor this is required.

Two men are assigned to each snow plow. The men selected should have a thorough knowledge of the divisions over which they work. They are required to pass a similar examination to that required of men qualifying for flagmen on trains. After it is decided that a new plowman is qualified to operate a plow he should receive special instructions from the supervisor or roadmaster. Perhaps one of the most common mistakes of inexperienced plowmen is to pull in wings and



raise flangers in a cut when there is a liability of the train becoming stalled. They think that by so doing they can get through. Should the train become stalled with the wings closed and the flangers raised, it becomes necessary to dig the plow and engine out, and if



FAST MOVING PLOWS LEAVE A CLEAN TRACK

they should succeed in getting through moving slowly with wings closed, it leaves a very bad track and one over which it is not safe to back a plow in order to go through the cut a second time. If the wings are kept open and the flangers down until the train becomes stalled, the engine has a good flange and can back out unaided and make as many runs as are necessary to clean the cut properly.

The addresses of all plowmen and flangemen are given to the superintendent, division engineer and chief dispatcher. When needed after working hours, they are

experienced man before he is allowed to operate a plow alone.

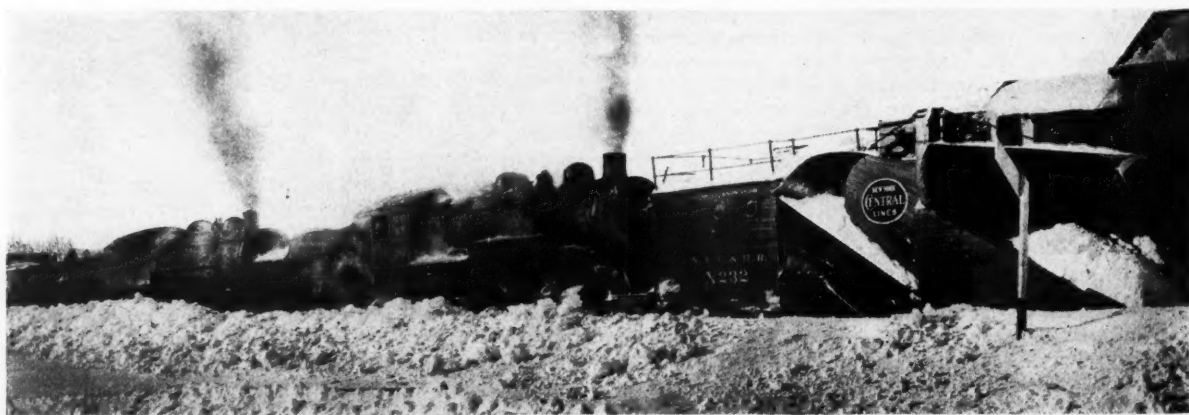
The plows are run ahead of the engine or engines and the flange cars behind. One member of the crew is permitted to ride with the plowman to observe signals and communicate them to the engineer by an air whistle provided for the purpose. The snow equipment is kept in first-class condition and is given a thorough inspection when it arrives at headquarters and is inspected at every available opportunity by the plowman when out on the road.

BUCKING SNOW

In any snowstorm the section men are usually at work before flangers and plows are started with instructions to see that all main track frogs, switches, guard rails, highway crossings and station platforms are kept free from snow and ice, giving particular attention to interlocking plants; to keep a sufficient distance of main line at stations clear to enable engines to start trains without slipping and to keep the supervisor informed of the intensity of the storm and the conditions on both main line and sidings so that the plow can be run when necessary.

The wing plow, which is the most powerful factor in removing snow, should be handled by the best motive power available. Two engines should be used when snow becomes so deep that one engine cannot push the plow at a speed of at least 40 miles per hour. Plows in operation should not be run at less than this speed, as they are not able to go through deep drifts without becoming stalled and will not throw snow with sufficient force but that some of it will roll back on the track in deep cuts. If plows are operated at a speed of 50 to 60 miles per hour, where the track is in condition to permit, they will throw the snow several feet from the track.

To operate plows with perfect safety they should in



AFTER THE BIG PUSH

called at the same time as the train crew. When not operating plows they assist section forces to do any work they are engaged in, being employed under the direction of the foreman.

The plowmen must be thoroughly familiar with the mechanism of the equipment to which they are assigned and should be capable of making minor repairs when necessary. The object of employing two men on the plow is to keep the plows in operation both day and night during severe storms. When a new man is employed, he is required to make several trips with an

all cases have exclusive use of track or an absolute block. This is the rule under which they are operated on the New York Central and has proven absolutely safe and has given excellent results. During severe blizzards it is sometimes necessary to run trains with the plow only one block ahead and in extreme cases it is advisable to reduce tonnage and to sidetrack and annul some freight trains. When snow becomes too deep in cuts to be handled by wing plows, a rotary equipped with wings is used. This will cut the snow wider and closer to the track than the wing plow.

SPECIAL PROBLEMS

A photograph which shows a 14-ft. switch stand surrounded by snow demonstrates how futile would be an attempt to remove snow from switches so located by any steam melting device on an engine when the wind reaches a velocity of 30 or 40 miles per hour. When such conditions are encountered the old reliable method of shovels and brooms is the only resort.

An attempt to keep snow and ice from the turntables by the use of steam from locomotives proved very unsatisfactory, being too slow under the severe weather conditions. However, it has been found possible to keep them free from ice and snow by opening the blow-off cocks on engines going to the roundhouse. While



SWITCHES MUST BE DUG OUT

this reduces the steam very quickly, it accomplishes the desired result. This, however, does not remove snow from the table pit and to do so the drain pipe which is located in the center of the pit is plugged and the pit filled to a depth of about 12 in. with water into which a 1-in. steam pipe is turned. This keeps the water sufficiently warm not only to melt the snow which falls into the pit but also the snow from surrounding tracks which is shoveled into the pit. When the water gets to a certain depth the plug is removed. By this method the labor of from 12 to 15 men was saved at one important roundhouse.

It has been found that hand sleighs equipped with side boards which will carry about $1\frac{1}{2}$ cu. yd. to be an economical means of removing snow at certain points and saves considerable work train service, particularly at station platforms where it is often necessary to carry the snow several feet to load it on cars and at many stations there are convenient places where snow can be drawn and dumped. Snow shovels 36 in. wide in light snow prove very satisfactory. One man with one of these will accomplish as much as three with an ordinary snow shovel and the men take them in preference to the ordinary snow shovels for sidewalks and station platforms. Some of the photographs shown will convince the most skeptical of the necessity of a sufficient quantity of the most improved snow equipment available. Severe snow conditions also demand the hearty co-operation of all departments. They call for quick decisions based on unerring judgment which can only be secured

from men schooled to adaptability by valued experience. Such action on the part of officers not only demands but secures and retains the confidence, loyalty and respect of subordinates, builds up and strengthens any organization and is one of the prime factors in the successful operation and advancement of America's greatest railroads.

RAILWAY TOBACCO FUND

ENCOURAGING progress is being made with the tobacco fund for the railway regiments in France. This project is being prosecuted actively along the lines explained in last month's issue and contributions are being received from a large number of railway supply companies. Following is a list of the contributions as recorded up to Tuesday, November 20:

Ajax Forge Company, Chicago, Ill.	.....
..... (to cover 15 months)	\$150	
Ajax Rail Anchor Co., Chicago	.....	10 a month
American Manganese Steel Co., Chicago Heights, Ill.	.....	" "
American Steel Foundries, Chicago	.....	" "
American Flexible Bolt Co., Pittsburgh, Pa.	.....	" "
Anti-Creeper Corporation, New York, N. Y.	.....	" "
Barco Mfg. Co., Chicago	..... (contribution)	25
Belle City Malleable Iron Co., Racine, Wis.	.....	10 a month
Bettendorf Company, Bettendorf, Iowa	.....	" "
Boss Nut Company, Chicago	.....	" "
Bronze Metal Co., New York, N. Y.	.....	" "
Buckeye Steel Castings Co., Columbus, Ohio	.....	" "
Bucyrus Co., South Milwaukee, Wis.	.....	" "
Buda Company, The, Chicago	.....	" "
..... (to cover 3 months)	30	
Camel Co., Chicago, Ill.	.....	10 a month
Carnegie Steel Company, Pittsburgh, Pa.	.....	" "
Cleveland Frog & Crossing Company, Cleveland	.....	" "
Crucible Steel Company of America, Chicago	.....	" "
Curtain Supply Co., Chicago	.....	" "
Damascus Bronze Company, Pittsburgh, Pa.	.....	" "
Dearborn Chemical Co., Chicago	.....	" "
Dickinson, Inc., Paul, Chicago	.....	" "
Dilworth, Porter & Co., Pittsburgh, Pa.	.....	" "
Economy Devices Co., New York, N. Y.	.....	" "
Fairbanks, Morse & Co., Chicago	.....	" "
Fort Pitt Malleable Iron Co., Pittsburgh, Pa.	.....	" "
Fort Pitt Spring & Mfg. Co., Pittsburgh, Pa.	.....	" "
Fowler Car Co., Chicago	..... (to cover 2 months)	20
Franklin Railway Supply Co., New York	.....	" "
..... (to cover 6 months)	60	
Haskell & Barker Car Co., Chicago, Ill.	.....	10 a month
Holloway, H. C., Chicago	.....	" "
Hunt-Spiller Mfg. Corporation, Boston, Mass.	.....	" "
Illinois Car & Mfg. Co., Hammond, Ind.	.....	" "
..... (to cover 6 months)	60	
Independent Pneumatic Tool Co., Chicago	.....	10 a month
Interstate Iron & Steel Co., Chicago	.....	" "
Imperial Appliance Co., Chicago	.....	" "
Kelly Reamer Co., Cleveland, Ohio. (contribution)	10	
Keyoke Railway Equipment Co., Chicago	.....	10 a month
Locomotive Superheater Co., New York	.....	" "
..... (to cover 1 year to November, 1918)	120	
Madden Co., Chicago, Ill.	.....	10 a month
MacRae's Blue Book, Chicago	.....	" "
Meek, J. E., New York	..... (to cover 6 months)	60
Miller Train Control Corporation, Staunton, Va.	.....	10 a month
Milwaukee Coke & Gas Co., Milwaukee, Wis.	.....	" "
Morden Frog & Crossing Works, Chicago	.....	" "
..... (to cover 3 months)	30	
More-Jones Brass & Metal Co., St. Louis, Mo.	.....	10 a month
Mudge & Co., Chicago	.....	" "
Ohio Injector Co., Chicago	.....	" "
Okonite Co., New York	.....	" "
P. & M. Co., Chicago, Ill.	.....	" "
Paxton-Mitchell Co., Omaha, Neb.	.....	" "
Pennsylvania Tank Car Co., Sharon, Pa.	.....	" "
Pickands, Brown & Company, Chicago	.....	" "
..... (to cover 15 months)	150	
Pilliod Company, New York	.....	10 a month
Pittsburgh Wood Preserving Co.	.....	" "
..... (to cover 2 months)	20	
Poole Brothers, Chicago	.....	10 a month
Pratt & Lambert, Inc., Buffalo	.....	" "
Prendergast Co., Marion, Ohio	.....	" "

Pyle-National Co., Chicago, Ill.....	" "	Spencer, Otis & Co., Chicago, Ill.....	10 a month
Q & C Co., New York.....	" "	St. Louis Frog & Switch Co., St. Louis, Mo.....	" "
Rail Joint Company, New York.....	" "	Standard Coupler Co., New York, N. Y.....	" "
Railroad Supply Co., Chicago, Ill.....	" "	Standard Forgings Co., Chicago, Ill.....	" "
Railway Age Gazette, New York, N. Y.....	" "	Standard Steel Car Co., Chicago, Ill.....	" "
Railway Materials Company, Chicago, Ill.....	" "	Strobel Steel Construction Co., Chicago, Ill.....	" "
Railway Review, Chicago, Ill.....	" "	Templeton, Kenly & Co., Chicago, Ill.....	" "
Railway Steel-Spring Co., Chicago, Ill.....	" "	Turbell, Jos. B., of American Brake Shoe & Foundry Co., New York.....(to cover 6 months)	60
Roberts & Schaefer Co., Chicago, Ill.....		Union Spring & Mfg. Co., Pittsburgh, Pa.....	
.....(to cover 15 months)	150	.....(to cover 6 months)	60
Runnells, Clive, and LeRoy Kramer of the Pullman Co.	10 a month	Valentine & Co., New York, N. Y.....	10 a month
Ryan Car Co., Chicago, Ill.....	" "	Vapor Car Heating Co., Chicago, Ill.....	" "
Safety Car Heating & Lighting Co., New York..	" "	Verona Tool Works, Pittsburgh, Pa.....	" "
Sargent Co., Chicago, Ill.....	" "	Vissering & Co., H., Chicago, Ill.....	" "
Sellers & Co., Wm., Philadelphia, Pa.....	" "	Waterbury Battery Company, Waterbury, Conn..	" "
Sherburne & Co., Boston, Mass.....	" "	Western Railway Equipment Co., St. Louis, Mo..	" "
Shults, F. K., New York, N. Y....(contribution)	25	Whiting Foundry Equipment Co., Harvey, Ill....	" "
Snow Construction Co., T. W., Chicago, Ill.....		Woodin, W. H., of American Car & Foundry Co., New York, N. Y.....(to cover 6 months)	60
.....(to cover 3 months)	30		

The Effect of Creosote on Marine Borers

BY C. H. TEESDALE,

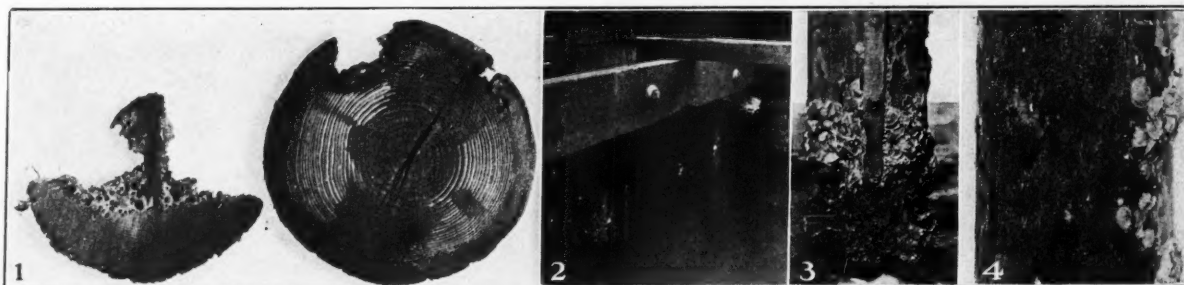
In Charge of Wood Preservation U. S. Forest Products Laboratory, Madison, Wisconsin,

and L. F. SHACKELL,

Professor of Physiology, University of Utah, Salt Lake City

IT is impossible for one unfamiliar with marine shipping to appreciate the immense annual losses occasioned by the attacks of marine borers against wooden structures—boat bottoms, harbor piling, etc. In the worst infested regions of the Atlantic, Pacific and Gulf coasts unprotected piling will not, as a rule, stand up for more than a single season. The economic losses do not stop with the destruction of wooden structures, for in certain situations their replacement often involves

to use a tile protection around creosoted piles where renewals are very expensive. The sections in Fig. 1 were taken from a creosoted longleaf pine pile destroyed by xylotrya at Gulfport, Miss., and removed in 1913 after 11 years' service, the cause of failure probably being uneven penetration. Fig. 2 shows the condition of wharf piling at the same place after four years of service and is typical of about 30 per cent of the piling in the structure driven at the same time. Fig. 3 shows



(1) SECTION OF A CREOSOTED LONGLEAF PINE PILE DESTROYED BY TEREDO AT GULFPORT, MISS. LEFT-HAND SECTION TAKEN AT SURFACE OF WATER AND RIGHT-HAND SECTION TAKEN AT MUD LINE. (2) CREOSOTED LONGLEAF PINE PILES BADLY DAMAGED BY TEREDO AFTER FOUR YEARS' SERVICE AT GULFPORT, MISS. (3) CREOSOTED LONGLEAF PINE PILE BADLY ATTACKED BY SPHAEROMA AFTER 12 YEARS' SERVICE AT MAYPORT, FLORIDA. (4) SECTION OF CREOSOTED LONGLEAF PINE PILE AFTER 4 YEARS' SERVICE AT BRUNSWICK, GA.

tedious work and much more expense than does their original installation.

STUDIED FOR MANY YEARS

For hundreds of years search has been made for an efficient protection against these attacks. During the past 50 years the use of creosote oils, particularly those obtained from coal-tar, has made great headway, until at present impregnation under pressure with coal-tar creosote may be considered a standard method of preserving piling. This method is, however, expensive, and its effectiveness by no means invariable. For example, 12 years is about the average life obtained from piling given an 18-lb. treatment and installed at Pensacola, Florida, and it is the practice of one of the railroads

a pile badly damaged by sphaeroma at the mouth of the St. Johns river at Mayport, Fla., after 12 years' service. It was in somewhat worse condition than the average piles in the structure of which it is a part. Fig. 4 shows the condition of creosoted longleaf pine piling after four years' service at Brunswick, Georgia. This pile shows heavy attacks by limnoria in the creosoted portion and is typical of a considerable portion of the wharf from which it was taken. In this last case the piles were exposed to the weather on the bank for one year before being driven, which may have been responsible for the short life in service.

There is an element of uncertainty in all except, perhaps, the heaviest treatments. Coal-tar creosote is a highly complex mixture of organic compounds (no two

creosote oils being identical in composition) and methods of analysis are limited mainly to fractional distillations carried out under arbitrary conditions, together with determinations of a few physical constants. Furthermore, it has not been known whether the effectiveness of a creosote oil against marine borers is due to its toxic constituents, to its viscosity, to high-boiling, practically non-volatile compounds, or to some combination of the foregoing. The development within recent years of a ready market for individual constituents of creosote—the phenols, naphthalene, tar bases, and so forth—has led to the widespread use against marine borers of oils from which these constituents have been removed in part, so that the composition of the oils must be widely different from that of the straight distillate oils used 20 or 50 years ago, and it is uncertain how the effectiveness of the oils is impaired. It is these oils, however, that have furnished the service data on

increase in resistance to attack as the boiling point of the preservative was raised. The high-boiling water-gas-tar creosote was almost as effective as coal-tar creosote. Of the other preservatives used, copperized oil, hardwood tar, timber asphalt and spiritine were not at all effective. Hence, it is concluded that products of petroleum and of the distillation of hard and soft woods are not effective in preventing attacks by marine borers.

RESULTS NOT ALL SATISFACTORY

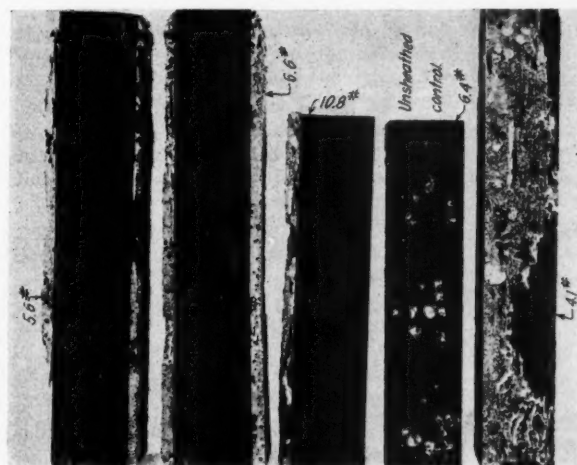
The later experiments indicate that low-boiling water-gas-tar distillates are ineffective. Zinc chloride or copper salts added to crude oil were of little value, while ferric chloride or copper salts added to creosote considerably increased the resistance, especially to limnoria attack. Naphthalene added to creosote decreased its resistance to the borers, especially limnoria. While the results indicate that additions of tar to creosote reduced the resistance to attack, this was due to the fact that the tar increased the difficulty of penetration, and, with the low 8-lb. absorptions, resulted in narrow, poorly-penetrated strips near the surface, in which the borers obtained a start. Where the specimens were well treated the general surface conditions indicated that tar increased the resistance to attack to a considerable extent. Ferric acetate solutions were of no value.

The shipworm, *xylotrya* (often confused with a less common relative, *teredo*), is perhaps the most destructive borer in American waters, and though a microscopic organism at the time of its entrance into a piece of wood, it may attain a length of several feet and a diameter of an inch. Widely different from this mollusc is the tiny crustacean borer, *limnoria*, which rarely attains a length above one-eighth inch, and yet because of vast numbers is fairly destructive. In spite of the great structural differences between these two forms, their reactions toward creosote poisons were strikingly similar.

Users of creosoted piling have been greatly puzzled occasionally on observing shipworms boring through heavily-creosoted wood. The writers have themselves seen this; but on following the burrows back, have very frequently found that the point of beginning the attack was at a spot which had received, if any, only very superficial treatment. These observations furnished the basis for a series of service tests to determine whether shipworms would pass from untreated into treated wood; and, if so, whether the type of treatment would determine the extent of their attack.

USE UNTREATED STICKS AS BAIT

Rectangular sticks of sap loblolly pine, about 3 in. by 3 in. by 36 in., finished on all sides, were treated at the Forest Products Laboratory with creosote and the several fractions. A series of treatments was also made with special preparations, as follows: (a) benzol, 90 per cent; (b) resublimed naphthalene, 25 per cent in gas oil; (c) pure phenol, 5 per cent in gas oil; (d) alpha-naphthol, 1 per cent in gas oil; (e) gas oil. After treatment the majority of the sticks were sheathed completely with untreated half-inch sap pine boards secured from the same source as the treated wood. The sheathing was surfaced on the side in contact with the treated core, and was secured to the latter with brass screws. One specimen in each treatment was left unsheathed as a control. The purpose of the sheathing was merely to serve as bait for the microscopic free-swimming shipworms, and later as shelter for the borers until they should attain a size sufficient to render them readily observable. The main object of these experiments, however, was to study the reactions of the borers on reaching the treated cores.



LIGHT TREATMENTS, WITH STRAIGHT CREOSOTE OF MEDIUM TOXICITY. DEPTH OF BORINGS AVERAGE $\frac{1}{4}$ IN. NO. 4 NOT ATTACKED.

which the reputed effectiveness of creosote oils in general has been based.

TESTS BY UNITED STATES FOREST SERVICE

For a number of years the United States Forest Service has been investigating methods of treatment and the efficiency of various preservatives, taking records on actual service tests, in an effort to overcome this destruction of timber by marine borers. At the same time the U. S. Bureau of Fisheries has been studying the life histories of the various borers. Since 1914 these bureaus have been working jointly on the problem and have published annual reports of progress made, this being the third such report.

The first series of tests was started in 1911 and 1912 with treated specimens of southern yellow pine, each about six inches in diameter and two feet long. Specimens treated with coal-tar creosote fractions were installed at Pensacola, Fla., Gulfport, Miss., and San Francisco, Cal., and specimens treated with various other preservatives were installed at Gulfport and San Diego. A second series of tests was started by installing additional specimens in 1914 and 1915. The species treated with coal-tar creosote fractions in 1911 were given an absorption of 18 lb. per cu. ft. and the later ones an absorption of 8 lb. per cu. ft.

Comparing the results obtained on the five fractions of creosote, it was noted that there was a progressive

PLACED IN SEMI-TROPICAL WATERS

The specimens were shipped to the U. S. Fisheries Station, Beaufort, North Carolina, and were installed in Beaufort Harbor in the middle of June, 1915—about five weeks after treatment. They were allowed to remain in the sea-water for six months and were then taken up and examined.

A typical result of these tests are illustrated in part in Fig. 5. Naphthalene, alpha-naphthol, phenol and benzol, in the proportions in which they were present, were ineffective in these service tests. Perhaps the most striking point, however, was the fact that in each of the sheathed specimens treated with creosote or its fractionates the borers passed from the untreated sheathing into the cores; whereas, the unsheathed controls in this group were unattacked.

The interpretation of these unexpected results lies in the peculiar life history of the shipworm. The latter invariably begins its attack on wood as a free-swimming larva, microscopic in size. At this time it is readily killed by traces of poisons which leak slowly from the surface of unsheathed creosoted specimens. But when such a larva has once obtained a foothold in the wood, it undergoes a radical metamorphosis and grows with great rapidity, so that it may attain a size thousands of times that of its larval state in two or three weeks. This great increase in size is accompanied by a correspond-

ing increase in resistance to creosote poisons; so that shipworms, which by some chance have obtained a foothold, may ultimately be enabled to burrow with apparent impunity through heavily-treated wood.

The value of high-boiling coal-tar creosote oils for this purpose may be considered as established, but further investigation is necessary to establish the value of specifying high-boiling acids and bases in oils for marine work. A liberal content of acids and bases would do no harm, and if these results have practical significance, they strongly indicate that they would increase the effectiveness of an oil.

SUMMARY.

1. The economic losses due to the activities of adult shipworms can never occur as long as treatments of wood for main structures are able to prevent attack by the microscopic and apparently insignificant shipworm larvæ.
2. Heavy treatments with a proper type of creosote will still prove inadequate as long as areas of superficially-treated sapwood, heartwood, knots, etc., are left exposed for the lodgment of shipworm larvæ.
3. It appears that a proper creosote oil for marine work should contain a large proportion of constituents boiling above 320 deg., as well as considerable amounts of high-boiling tar acids and bases.

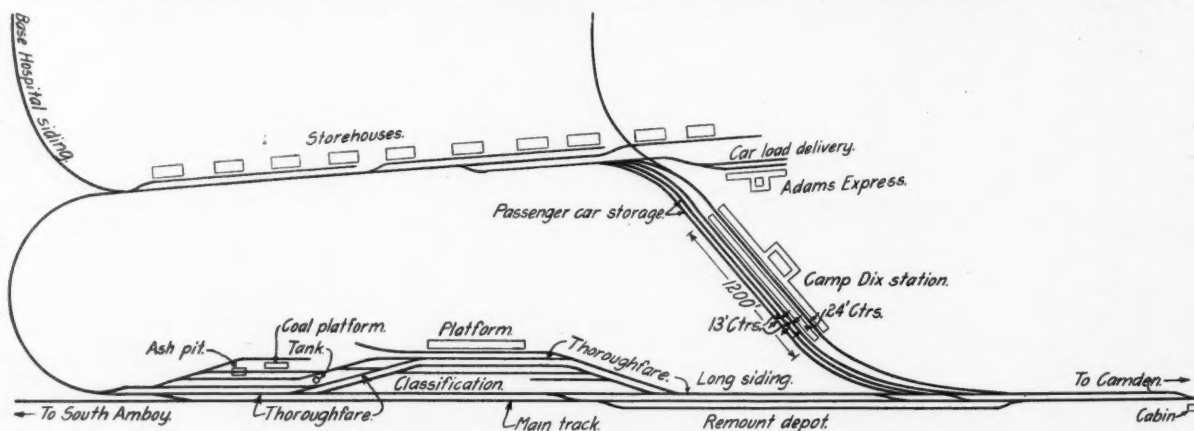
The Railway Terminal at Camp Dix

BY W. F. RENCH,

Superintendent, James McGraw Company, Wrightstown, N. J.

THE need for quick action in the construction of trackage at the army cantonment near Wrightstown, N. J., since named Camp Dix, was even more insistent than that upon the camp itself. The site of the cantonment is half-way between two stations on

When fully organized, the consumption of materials, principally lumber, amounted to 100 carloads per day. This had to enter the reservation over a long siding, quickly constructed by the railroad, and a siding two miles long with five spurs reaching directly into remote



TRACK LAYOUT AT CAMP DIX

the single-track branch line of the Pennsylvania which runs from Camden through the heart of New Jersey to the seaboard at South Amboy. There was no siding nearer to the camp than the station facilities which were, in each case, one and one-half miles distant from the first of the barracks to be erected. This long haul by teams, later improved by the introduction of motor trucks, made progress in the construction of the camp in the early stages exceedingly slow.

parts of the camp. The siding to the base hospital served that operation alone, and another siding, not shown on the plans, supplied materials for the magazine section.

The labor question, a very trying one at best, was especially acute at this time. In order to attract a good class of labor three principal inducements had to be held out, viz.: high wages, a long working day and comfortable quarters. That these were effective is evidenced by

the building up of a force approximating 350 men in one month. The work is still under way, five months after its inception, and many of the men employed at the beginning are still on the job. There has been no labor trouble, no sickness in the camp and the quality of the output is entirely acceptable to the employer.

The labor forces were mainly drawn from Philadelphia and Camden and were almost exclusively Italian. At the peak of the work as many as 75 negroes were employed and care was taken to isolate these men, both in camp and as far as possible on the work. The Italian is preferable for track work because he will stay longer and thus give a better return for the time spent while he is being trained.

ASSIGNMENT OF MEN VITAL

Assignment of the men to the different classes of work, such as grading, handling material, tracklaying, and later to the maintenance of the facilities, was the most important business in the superintendence. The selection of the foreman was not generally a matter of choice. Italian laborers usually travel in gangs with a self-chosen leader, and to refuse the leader is tantamount to losing the men. The problem thus became one of training the foreman, or, if he was incapable, of picking out one of the men of the gang who could be trained.

The site selected for the laborers' camp was on a slight rise of ground along the edge of a wood, near a plentiful supply of good drinking water, assuring good drainage. The camp was built in sections 48 ft. long, which were divided in halves by a partition. The sections were continuous in a straight line. The width of the shelter was 18 ft. and the height at the eaves was 6 ft. The roof was covered with 2-ply tar paper. With the approach of cold weather the sides were similarly covered, and a wood-burning stove was supplied for each full section. One section was devoted to the use of a general lounging-room for rainy days. A large stove in the center furnished the heat necessary to dry damp clothes. It also contained several stoves for inside cooking when this could no longer be done outside. The well supplying water was provided with three pumps and was protected against use for washing of persons or clothing. The commissary store was well stocked and had ample counter room to obviate delays in the early morning.

As the plan shows, there were 41 switches to be placed and about $8\frac{1}{2}$ miles of track to be built. The connections were nearly all No. 8 and were laid to P. R. R. standard. New Pennsylvania section 100-lb. rail was used throughout the main tracks and switches, and new ties were laid, except in the case of several of the less important tracks in the shop yard, where some good second-hand ties were interspersed. The curves and switch connections were fully tie-plated. The tracks were ballasted with cinders to a depth of 6 in. below the bottom of the ties. The maximum grade was fixed at 1 per cent and the sharpest curve, that of the loop, has a radius of 435 ft. Eighteen thousand yards of grading were required, which was entirely of earth and divided about equally between cuts and fills. Eighteen teams were employed in the grading and delivery of materials. The facilities were practically in operation coincident with the arrival of troops, although much work remained to be done in surfacing and lining the tracks under the considerable traffic imposed upon them.

RETAINED FORCE FOR MAINTENANCE

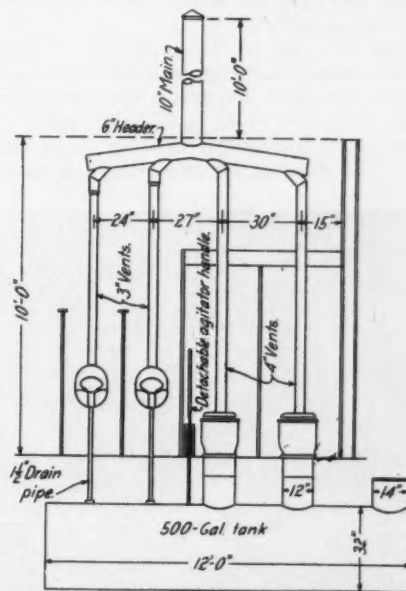
On September 10 the force was reduced to 70 laborers in charge of 5 foremen and assigned to the maintenance of the completed trackage. The intensive operation im-

mediately established by the continuing construction of the camp and the macadam road work, along with the supplies for the quartermaster, made necessary an active program of maintenance. The gangs retained were those which had shown ability in lining and surfacing, and were given a sliding itinerary of work. When drill operations held them up indefinitely at one point, they moved to another place. Any considerable use of the track was arranged for beforehand. Special stress was laid upon completing each day's surfacing with a general lining. The connections had been placed in their exact locations to stakes set by the engineer, and furnished the necessary guide for the lining. The tracks were promptly back-filled as surfacing or raising was completed. Ample ditches, placed early, facilitated the final settlement of the roadbed.

The building of the terminal trackage was done by the James McGraw Co. of Philadelphia, under the supervision of the division officers of the Pennsylvania Railroad, E. J. Cleave being superintendent.

IMPROVED CAMP SANITATION

ONE of the most serious problems encountered in the management of labor camps is sanitation. Even if countenanced by the public authorities, the primitive methods which have been in use in years gone by for



TYPICAL KAUSTINE EQUIPMENT

the disposal of garbage and body wastes in camps remote from established sewer systems are not only conducive to poor health of the men and to epidemics of enteric diseases, but are in direct opposition to the current tendencies for the betterment of camp conditions. In these days camps must be made attractive in every way in order to retain men.

The difficulty has been that there was no substitute for the modern plumbing and sewerage systems, and these involve expenditures for installations that are absolutely out of the question for anything as temporary as the ordinary construction or maintenance camps. They also imply a plentiful water supply and a means of sewage disposal that is not objectionable to adjoining property owners; both conditions that are not always easy to fulfill.

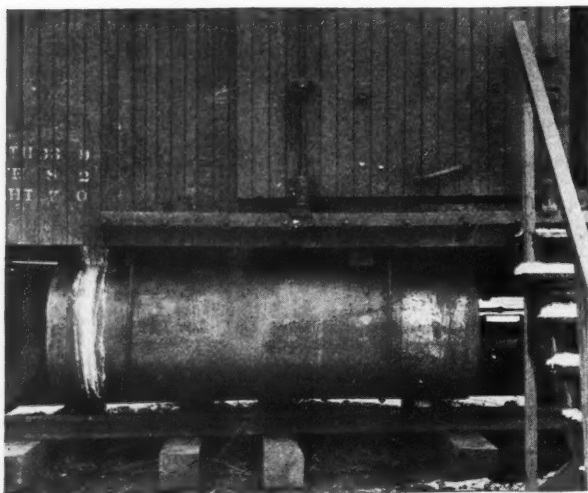
Such a substitute is now offered in the Kaustine waterless toilet system. As the name indicates, no water is needed in the operation of this type of toilet, the two principal functions of which are chemical sterilization of the sewage matter by a chemical known as Kaustine and a ventilation which carries away all odors.

The Kaustine toilet has the general appearance of a water toilet, with its white china bowl and seat and cover. The bowl is attached to an Armco iron antiseptic tank in which has been placed the necessary amount of disinfecting chemical, which is designed to dissolve the solid matter, kill all germ life, and reduces the remaining portion of the tank contents to a harmless state suitable to be drained off into the ground without any fear of contaminating effect.

INSTALLATIONS OF VARIOUS SIZES

This system can be made to accommodate any number of men. Where the camp is a large one, the most practical way to solve the toilet problem is to place all the toilets in one building. This building can be placed in close proximity to the remaining houses of the camp. Where the camp only accommodates a small number of men the toilets can be placed at one end of the bunk house. One of the best arrangements used thus far in laboring camps is shown in the drawing. The bunk house accommodates 40 men and is an excellent arrangement, giving the men first-class comforts and convenience in one building.

To prevent freezing of the contents antiseptic tanks are generally buried in the ground and should be about 30 in. below the floor on which the bowl sets. The largest tank carried in stock is 32 in. in diameter, making the bottom of the largest tank set 62 in. below the floor line. The distance between the floor and the top



KAUSTINE TANK ATTACHED TO A BUNK CAR

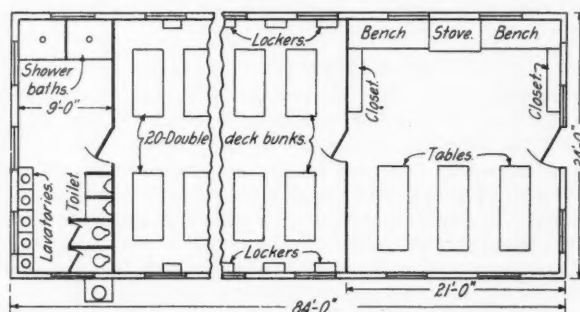
of the tank can be reduced to 18 in. if required, this distance being the minimum. Each tank is equipped with an internal valve for emptying purposes. This valve may be connected up with the disposal bed by 4-in. common tiling. Special tanks can be made to fit special conditions arising.

A large disposal bed is unnecessary because nothing save the body wastes are retained to be disposed of. The tank requires emptying about twice a year if one unit is used for every 15 men. If an old cesspool is close by, the tank drain can be used. The most com-

mon arrangement for disposal is a pit about 10 or 12 ft. deep filled with coarse cinders into which the tank contents drains and seeps away readily. One hundred and twenty-five gallons tankage capacity is required for each unit (either bowl or urinal) in use.

USED ON A NUMBER OF RAILROADS

The Pennsylvania Railroad is using these toilets in laboring camps at Philadelphia, Hill Crest, Frankford Junction, Reading, Middletown, Altoona, Huntington, Cresson, Pitcairn, Pa., Buffalo, N. Y., and other points. The Lehigh Valley is using them at Easton, Pa., with



EXAMPLE OF A SANITARY INSTALLATION

several other camps soon to be equipped. The Delaware & Hudson has equipped its camps at Saratoga, Watervliet and Carbondale, Pa. The Baltimore & Ohio is equipping camps at Pittsburgh, Pa., and at Niles Junction and Youngstown, Ohio.

The Albany Southern; the Buffalo, Rochester & Pittsburgh; the Baltimore & Ohio; the Boston & Maine; the Lehigh & New England; the Maine Central; the Mobile & Ohio; the New York Central, and Philadelphia & Reading are also using this type of toilet in stations, signal towers, crossing watchmen's houses and other buildings which cannot be connected to a sewer. The Lehigh & New England has its shops at Pen Argyl equipped with this type of toilet.

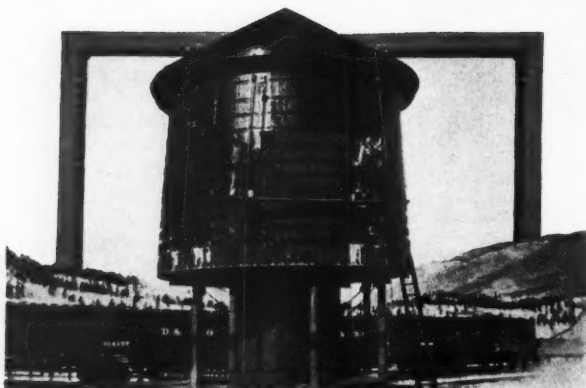
These systems are simple in construction and are said to be easily erected. A carpenter, with few tools, can readily do the work. The photograph shows the manner in which the Kaustine tank was attached to a car equipped as a toilet for a camp on the Pennsylvania Railroad. The position of the tank as hung is such that it extends beyond operating clearance lines. In consequence, each time the car is moved the tank is disconnected, emptied and cleaned and placed inside the car until the next location is reached. The equipment is manufactured by the Kaustine Company, Inc., Buffalo, N. Y.

NATIONAL RAILWAY APPLIANCES ASSOCIATION EXHIBIT

THE success of the tenth annual exhibit of the National Railway Appliances Association, which will be held in the Coliseum and Annex, Chicago, March 18 to 21 inclusive, 1918, has been assured by the large number of applications for space which have been received. Because of the fact that a large number of firms were unable to secure space last year the floor plan has been rearranged to permit 30 more exhibit spaces to be provided than last year, making a total of 264 spaces in all. At a meeting of the Board of Directors of the Association on November 12, a total of 257 of the 264 spaces were assigned. The members of the association this

year, practically all of whom have made reservations for space, are as follows:

- Adams & Westlake Co., Chicago.
 Adams Motor & Manufacturing Co., Chicago.
 A. G. A. Railway Light & Signal Co., Elizabeth, N. J.
 Ajax Rail Anchor Co., Chicago.
 Alger Supply Co., Chicago.
 American Hoist & Derrick Co., Chicago.
 American Kron Scale Co., New York, N. Y.
 American Steel & Wire Co., Chicago.
 American Vulcanized Fibre Co., Wilmington, Del.
 American Valve & Meter Co., Cincinnati, Ohio.
 Armco Iron Culvert & Flume Manufacturers' Association, Middletown, Ohio.
 Associated Manufacturers of Malleable Iron, Cleveland, Ohio.
 Automatic Electric Co., Chicago.
 Ayer & Lord Tie Co., Chicago.
 Asbestos Protected Metal Co., Pittsburgh, Pa.
 Alexander Crossing Co., Clinton, Ill.
 American Auto Connector Co., Cleveland, Ohio.
 Allith-Prouty Co., Danville, Ill.
 Anti-Creeper Corporation, New York.
 Barrett Co., The, Chicago.
 Bethlehem Steel Co., So. Bethlehem, Pa.
 Bryant Zinc Co., Chicago.
 Brach Supply Co., Newark, N. J.
 Buda Co., Chicago.
 Baker, John, Jr., Chicago.
 Carnegie Steel Co., Pittsburgh, Pa.
 Cambria Steel Co., Philadelphia, Pa.
 Chipman Chemical Engineering Co., New York.
 Chicago Steel Post Co., Chicago.
 Carbic Mfg. Co., Duluth, Minn.
 Cast Iron Pipe Manufacturers' Association, New York.
 Chicago Bridge & Iron Works, Chicago.
 Chicago Flag & Decorating Co., Chicago.
 Chicago Malleable Castings Co., Chicago.
 Chicago Pneumatic Tool Co., Chicago.
 Chicago Railway Signal & Supply Co., Chicago.
 Cleveland Frog & Crossing Co., Cleveland, Ohio.
 Crear-Adams & Co., Chicago.
 Corning Glass Works, Corning, N. J.
 D. & A. Post Mold Co., Three Rivers, Mich.
 Detroit Graphite Co., Detroit, Mich.
 Dilworth Porter & Co., Inc., Pittsburgh, Pa.
 Dickinson, Paul, Inc., Chicago.
 Dixon Crucible Co., Jos., Jersey City, N. J.
 Duff Mfg. Co., Pittsburgh, Pa.
 Dayton Malleable Iron Co., Dayton, Ohio.
 Edison, Inc., Thos. A., Bloomfield, N. J.
 Edison Storage Battery Co., Orange, N. J.
 Electric Railway Improvement Co., Cleveland, Ohio.
 Electric Storage Battery Co., Philadelphia, Pa.
 Eymon Continuous Crossing Co., Marion, Ohio.
 Elyria Iron & Steel Co., Cleveland, Ohio.
 Fairbanks Morse & Co., Chicago.
 Fairmont Gas Engine & Railway Motor Car Co., Fairmont, Minn.
 Federal Signal Co., Albany, N. Y.
 Frictionless Rail Co., Boston, Mass.
 General Railway Signal Co., Rochester, N. Y.
 Gurley, W. & L. E., Troy, N. Y.
 General Electric Co., Schenectady, N. Y.
 Gould Storage Battery Co., New York, N. Y.
 Grip Nut Co., Chicago.
 Graver Tank Works, East Chicago, Ind.
 Hatfield Rail Joint Co., Macon, Ga.
 Hazard Mfg. Co., Chicago.
 Hyatt Roller Bearing Co., Newark, N. J.
 Hall Switch & Signal Co., New York.
 Hayes Track Appliance Co., Richmond, Ind.
 Hoeschen Mfg. Co., Omaha, Neb.
 Hubbard Mfg. Co., Pittsburgh, Pa.
 Handlan-Buck Mfg. Co., St. Louis, Mo.
 Hunt & Co., R. W., Chicago.
 Hagaman Castle Supply Co., New York.
 Ingersoll-Rand Co., New York.
 International Steel Tie Co., Cleveland, Ohio.
 Iowa Gate Co., Cedar Falls, Iowa.
 Johns-Manville Co., H. W., New York.
 Jennison Wright Co., Toledo, Ohio.
 Joyce Cridland Co., Toledo, Ohio.
 Jordan Co., O. F., East Chicago, Ind.
 Julian Beggs Signal Co., Terre Haute, Ind.
 Kaustine Co., Buffalo, N. Y.
 Kalamazoo Railway Supply Co., Kalamazoo, Mich.
 Kellogg Switchboard & Supply Co., Chicago.
 Keppler Glass Construction Co., Inc., New York.
 Kerite Insulated Wire & Cable Co., New York.
 Keystone Grinder & Manufacturing Co., Pittsburgh, Pa.
 Kelly-Derby Co., Inc., Chicago.
 Kilbourn & Jacobs Manufacturing Co., Columbus, Ohio.
 Kettle River Co., Minneapolis, Minn.
 Kirby Frog & Switch Co., Birmingham, Ala.
 Lackawanna Steel Co., Buffalo, N. Y.
 Louisiana Red Cypress Co., New Orleans, La.
 Lehon Co., The, Chicago.
 Lufkin Rule Co., Saginaw, Mich.
 Lidgerwood Mfg. Co., New York.
 Lane & Bolder, Chicago.
 Long, Chas. R., Co., Louisville, Ky.
 M. W. Supply Co., Philadelphia, Pa.
 Madden Co., The, Chicago.
 MacRae's Blue Book Co., Chicago.
 Massey Co., C. F., Chicago.
 Miller Train Control Corp., Danville, Ill.
 Morden Frog & Crossing Works, Chicago.
 Mudge & Co., Chicago.
 McGraw Hill Publishing Co., New York.
 Marsh & Truman Lumber Co., Chicago.
 Monroe Calculating Machine Co., Chicago.
 Mercury Mfg. Co., Chicago.
 McComber & Whyte Co., Kenosha, Wis.
 National Carbon Co., Cleveland, Ohio.
 National Lock Washer Co., Newark, N. J.
 National Indicator Co., Long Island, N. Y.
 National Concrete Machinery Co., Madison, Wis.
 National Lead Co., New York.
 National Malleable Castings Co., Cleveland, Ohio.
 Nichols & Bros., G. P., Chicago.
 Northwestern Motor Co., Eau Claire, Wis.
 National Surface Guard Co., Chicago.
 Ogle Construction Co., Chicago.
 Okonite Co., New York.
 O'Malley Beare Valve Co., Chicago.
 Otley Paint Mfg. Co., Chicago.
 Post, G. A., New York.
 Patterson, W. W., Co., Pittsburgh, Pa.
 Positive Rail Anchor Co., Marion, Ind.
 Page Steel & Wire Co., Monessen, Pa.
 P. & M. Co., Chicago.
 Pocket List of Railway Officials, New York.
 Protective Signal Manufacturing Co., Denver, Colo.
 Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
 Polk-Genung-Polk Co., Chicago.
 Penton Publishing Co., Cleveland, Ohio.
 Q. & C. Co., New York.
 Roos Foundry Co., Henry, Chicago.
 Rail Joint Co., New York.
 Railway Review, Chicago.
 Ramapo Iron Works, Hillburn, N. Y.
 Reading Specialties Co., Reading, Pa.
 Roberts & Schaefer Co., Chicago.
 Railway Motor Car Co. of America, Chicago.
 Railroad Supply Co., The, Chicago.
 Railroad Water & Coal Handling Co., Chicago.
 Simmons-Boardman Publishing Co., New York.
 Signal Accessories Co., New York.
 Safe Lock Switch Machine Co., Lexington, Ky.
 Sellers Manufacturing Co., Chicago.
 Snow Construction Co., T. W., Chicago.
 Squire-Cogswell Co., Chicago.
 Simmen Railway Automatic Signal Co., Buffalo, N. Y.
 Southern Pine Association, New Orleans, La.
 Standard Asphalt & Refining Co., Chicago.
 Standard Underground Cable Co., Pittsburgh, Pa.
 Simple Gas Engine Co., Menasha, Wis.
 Silver Steel Tie Co., New York.
 Sperry, H. M., New York.
 Tyler Underground Heating System, Pittsburgh, Pa.
 Templeton, Kenly Co., Chicago.
 Track Specialties Co., New York.
 Toledo Scale Co., Toledo, Ohio.
 Union Switch & Signal Co., Swissvale, Pa.
 U. S. Wind Engine & Pump Co., Batavia, Ill.
 Volkhardt Co., The, Stapleton, N. Y.
 Verona Tool Works, Pittsburgh, Pa.
 Wayne Oil Tank & Pump Co., Fort Wayne, Ind.
 Wyoming Shovel Works, Wyoming, Pa.
 Waterbury Battery Co., Waterbury, Conn.
 Western Electric Co., New York, N. Y.
 Wharton, Wm., Jr., & Co., Easton, Pa.
 Whall Co., C. H., Boston, Mass.
 Whitaker-Glessner Co., Portsmouth, Ohio.
 Yale & Towne Manufacturing Co., New York.



CONVENTION OF THE MASTER PAINTER'S ASSOCIATION

The Fourteenth Annual Meeting of This Maintenance of Way Association Was One of the Most Successful

THE fourteenth annual convention of the Maintenance of Way Master Painters' Association of the United States and Canada, which was held at the Hollenden Hotel, Cleveland, Ohio, on October 16 to 18, inclusive, was well attended and the various sessions received the active interest of the members. The study of subjects by committees, a new feature in this association, was of no little benefit in rounding out the program. The officers of the Association for the past year were: President, F. C. Rieboldt, master painter, Chicago, Milwaukee & St. Paul, Milwaukee, Wis.; first vice-president, H. E. Conrad, master painter, Pennsylvania Railroad, Huntington, Pa.; second vice-president, A. E. Wilson, master painter, New York, New Haven & Hartford, Hartford, Conn.; secretary-treasurer, F. W. Hager, master painter, Fort Worth & Denver, Fort Worth, Texas. A brief report of the convention was given in last month's issue.

The convention was called to order by President Rieboldt with an attendance of about 40 members and guests. After prayer by Rev. John S. Ruthledge, an address of welcome was made by Harry L. Davis, mayor of Cleveland, who spoke on the efforts being made by the people of the city to insure the success of the second Liberty Loan. Mr. Rieboldt, in his address, called particular attention to the steps taken by the American Railway Association which are designed to bring about the eventual co-ordination of the work of the various voluntary railway organizations, the plan being to designate the American Railway Engineering Association at the primary body to exercise proper supervision and discipline over the other maintenance of way organizations. He urged a consideration of the matter by the convention. The secretary's report showed a membership of 75, there being no appreciable change in the total number of members during the past year.

Following are abstracts and discussions of papers presented at the several meetings.

PROTECTING THE PUBLIC FROM PAINT

By H. B. WILSON

Master Painter, Bessemer & Lake Erie, Greenville, Pa.

Different conditions are encountered in repainting the interiors and exteriors of railroad buildings where the traveling public is moving to and fro, or loitering while waiting for trains. For work at stations where travel is heavy, quick drying materials are a necessity for minimum interference with traffic. Durability must sometimes be overlooked in consequence since slow drying finishing coats are more elastic and tough than quick drying coats. Staging is commonly provided according to the standards of the railroad or state laws. Follow-

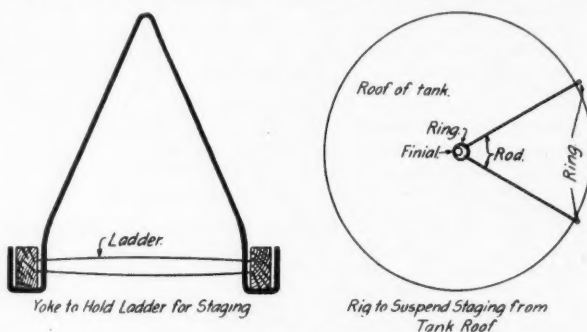
ing are a few considerations for the protection of the traveling public and men who are doing the work:

Visit your job previous to renovating and note what rigging and materials will be needed, as this will save trouble in the long run. When you get moved to the job examine all rigging to be used and be sure that it may be trusted, and when hanging or placing it see that it has the proper footing or support.

On interiors used by the traveling public while work is in progress, before applying any materials place warning signs on the outside of the building. Also hang small ones on the interior, using strings or wires so they will move to and fro and attract attention.

Remove all unnecessary fixtures from the room or place them where least in the way. Where it is possible, rope or fence off part of the building and finish this before doing another part. If the seats are to be refinished, and can be finished elsewhere, take part of them at a time, using benches or chairs to replace them.

As trestles and planks are generally used to do the upper parts of interiors, drop cloths of light material can be stretched or hung directly underneath the scaffolding or stretched over the tops of planks, and thin



TANK SCAFFOLD FIXTURES

boards of the same width as the planks may be laid on top to hold the cloths in position and to show the painters where to walk. Drop cloths should be used on floors where needed. It is good policy to keep one man on the floor to wipe up and look after things in general pertaining to the job.

In refinishing exteriors where trestles are used, drop cloths can be employed as in the interiors and where swinging staging is used a drop cloth for the protection of the public, as long as the staging and twice as wide with wooden strips, tacked or fastened on each end can be clamped on the bottom of the staging and easily removed when rehanging the staging.

DISCUSSION

A lively discussion followed the reading of this paper, which brought out the relative merits of drop cloths and

building paper for protection against drops of paint. This led to the conclusion that while building paper does very well where floors only are to be protected, it would not serve as a substitute for drop cloths in case of protection to furniture or when painting a large waiting room with a lofty ceiling while passengers made use of the floor.

PAINTING WATER TANKS

COMMITTEE REPORT

Reports were received from committee members on the Pennsylvania Lines, the Atchison, Topeka & Santa Fe and the Cincinnati Northern. The report from the Pennsylvania Lines covered the use of swinging stages on which to do the work on the tub and the outside of the supporting posts. A handline is attached to the post (finial) that extends above the roof, provided the post is found safe. Otherwise a hole is bored in the roof through which the rope is passed and made secure to a timber on the inside. This handline serves to assist the painters in moving the stage. A medium sized stage hook, to which the block and falls are attached, is hooked in the roof about 10 in. from the edge. The painting of the bottom of the tub and frame is done by other painters while the stage work is going on. This report also stated that a number of new tubs had been painted on the inside with two coats of paint with very good results.

A report from the Santa Fe outlined a very safe method of painting tanks, the rigging consisting of a $\frac{3}{4}$ -in. line and double blocks, and $\frac{7}{8}$ -in. iron hooks about 8-in. long made square, with eyes in which to hook the blocks. The hooks are made with enough clearance so that the painters can slide them with the blocks and falls around the iron at the top of the tank from the ground when changing from one stretch to another. The tanks are all open at the top except the filter tanks. A $\frac{3}{4}$ -in. rope bridle is used on the stirrups in preference to the iron one.

In cleaning the tanks the usual tools, scrapers, chipping hammers and wire brushes are used. Tanks have been cleaned with a sand blast, as they are all steel. The committee believes that tanks should be painted very soon after cleaning because a thin coat of rust forms quickly on the steel. Sand blasting tanks is a practical and sure method of cleaning when there is a good supply of sand and air obtainable and the proper rigging is to be had. The touching up of the rusty spots while cleaning tanks was also reported. This makes a very satisfactory job where the tanks are given only one coat of paint.

"Safety First" was the slogan of the Cincinnati Northern report. Swinging stages are preferred to ladders and it is agreed that ladders are slow and not very safe.

Another report from a Santa Fe man covered the use of small steel cable instead of rope for stirrups. In this case a $\frac{3}{4}$ -in. rope and double blocks with a 16-ft. stage is used, together with hook similar to those described above. The tanks are all steel, 28 to 65 ft. high.

Difficulty is experienced in painting tanks while sweating on a cloudy and warm day. As it is impossible to paint tanks in this condition, the only solution is to go to another job and come back when the weather is more favorable. Several different kinds of paint have been used on tanks with uniformly good results. It is believed that if water tanks are given a good coat of paint once every two years they will always be in good condition. It is not thought necessary to paint the interior of water tanks when treated water is used.—Bert E. Darrow (A. T. & S. F.), Chairman.

DISCUSSION

M. S. Ebel (C. H. & D.) said that he used 12-in. planks 12 ft. long for staging. Longer planks are of no use because of the curve of the tank. He said that he fastens the lines to the finial, if it was substantially constructed, and if not he takes a sling around the finial with a back line down the other side of the tank. He

also called attention to the danger of cutting the ropes on the edge of the roof, and described a scheme in which rods were used in place of ropes, following the general idea indicated in the sketch. F. C. Rieboldt (C. M. & St. P.) described a hook he used for holding a ladder used as a staging plank as shown in the drawing. C. H. Plummer (D. & R. G.) said that he used something similar to the device Mr. Ebel described, but instead of rods he used a rope ring over the finial with a piece of air hose over the ropes at the places where they passed over the edge of the roof. There was also some discussion of the use of guard rails on staging required by statutes in some states. The laws usually provide that the rails shall be on the outside of the plank, whereas the consensus of opinion was in favor of a rail on the building side, since the painters naturally lean toward the building. Some of the members favored the use of a



F. C. RIEBOLDT
President

$\frac{3}{8}$ -in. rope as a life line independent of the staging rope.

In discussing the use of ladders to paint tanks, attention was drawn to the danger of this practice when painting a roadside tank on the side nearest the track since the foot of the ladder might in some cases come within the operating clearance. H. E. Conrad (P. R. R.) stated that there was no alternative but to flag trains when this condition existed.

FLOOR FINISHES

By H. B. WILSON,

Master Painter, Bessemer & Lake Erie, Greenville, Pa.

This discussion is limited to three standard woods used in floors—oak, maple and yellow pine. It is to be understood that the floors are of seasoned wood, laid solidly on floor joists, dressed free from dirt, and that the floor finish is applied in a temperature of at least 70 deg. F. and kept at that temperature, or nearly so, until all materials applied have thoroughly dried.

To get the greatest durability from any one of the three woods, they should first be flushed over with raw linseed oil, bleached or unbleached, heated to a tempera-

ture of about 150 deg. F., and left to soak into the floor for a few hours. Later the excess oil should be wiped up and the floor left to dry thoroughly before applying any finish. The oil may be colored any shade desired for the wood before applying.

Either bleached or unbleached oil will darken the wood in time, the unbleached more so than the bleached, so if it is desired to hold the natural color as the shade of the wood it is better to omit the oil coat. Maple and yellow pine floors which are oiled will darken with age much quicker than the hard, open-grained woods such as oak and chestnut; so for dark finishes on floors it is better to use the oil coating.

A tough drying long oil floor varnish will outwear a waxed surface, but if not properly cared for the waxed surface will be cheapest by far in the end, as a spot in the waxed surface that is not too badly worn can be rewaxed in a few moments, while the same spot on a varnished surface would necessitate the removal of the varnish on the whole length of the worn piece of flooring. If necessary to remove the whole of either finish for renewal the wax finish is by far the easiest and cheapest to remove. However, I would not advise the general use of wax-polished floors on account of the unsafe footing which they supply, but would suggest their use in places where their slippery condition would be known to the persons using them. Otherwise serious accidents may occur.

Cerosine wax (taken from sugar cane) and carnauba wax (taken from the Brazilian wax palm, used in equal proportions, will polish with a harder film than bee's wax, and give more wear. The same waxes pressed firmly in cracks $\frac{1}{8}$ in. in width or less will give good satisfaction as a filler; but a still better one for small cracks is the stiff portion of a natural paste filler taken from the bottom of a settled can.

SUGGESTED SPECIFICATIONS.

VARNISHED YELLOW PINE FLOORS.

The floor must be dry and free from all foreign substance.

If the floor is to be stained, color the heated raw linseed oil, flush the floors and let them stand for a few hours, wipe up the surplus oil and let dry, or brush the oil stain well into the floor and allow to dry.

Color the crack filler and press it firmly into cracks, cleaning all surplus filler away from the edges, give it time to dry, and sandpaper the whole surface with 00 paper.

Dust well and give a coat of tough drying long oil floor varnish and let dry.

Sandpaper the varnished coat with 0 paper, dust and wipe the whole floor with a clean cloth or a sponge dampened lightly with water to pick up and dust and give another coat of the same varnish.

A third coat of the same varnish should now be applied for a complete job, rubbed level with pumice stone and oil.

If the floor is to be left in the natural, omit the oil coat, and instead give the bare wood a coat of white shellac, fill cracks and follow with varnish coats.

WAXED YELLOW PINE.

If the floors are to be colored, wax over a colored linseed oil flushed or brushed surface with two coats or more of floor wax well polished between coats.

If left in the natural, wax over the floor after it has been given coat of white shellac.

Maple floors should be treated same as yellow pine.

VARNISHED OAK FLOORS.

The floors should be dry and free from foreign substances.

If the floors are to be stained, color heated raw linseed oil and brush well into wood and allow to dry.

Fill all checks and voids flush with surface of wood with a paste filler of the desired shade.

Fill all cracks with a crevice filler, removing all surplus from the edges of the cracks and let dry.

Sandpaper the surface with 00 paper and dust thoroughly, and then apply a coat of tough drying long oil floor varnish and let dry.

Apply two more coats of the same varnish, sanding between coats and rub to a level surface with pumice stone and oil after the varnished surface is thoroughly dry, omitting the pumice stone rub if a high gloss is desired.

If the floors are to be left in the natural omit the oil stain and fill the wood with a natural paste filler, give a thin coat of white shellac and follow with varnish coats.

WAX FINISH FOR OAK FLOORS.

If the floors are to be stained, use two or more coats of floor wax, polished between coats and applied over the floor after it has been filled.

If the floor is to be left in the natural, fill the checks and voids of the wood with a natural paste filler.

Fill all crevices with crevice paste colored to match the floors, let dry, sandpaper with 00 paper, and give two or more coats of wax, polished between coats.

Wax for all floors with wax in paste form.

Unbleached shellacs, varnish gums and oils should be used in preference to bleached materials, as they are tougher and discolor less with age.



A. E. WILSON
Vice-President

EFFICIENCY, ECONOMY AND SAFETY FIRST

By H. F. JONES,

Master Painter, Big Four, Wabash, Ind.

Paint materials at the present time are very high and we should keep a very close watch on them and also our tools. Make every pound of paint do its duty. See that the best of care is taken of brushes, and get all the service out of them that is possible. Have a receptacle in the car or shop for those that are worn out, as there is a sale for them. We never throw away the steel kegs we receive lead in. When we empty them they are shipped to the storekeeper, who has bails put on them and they are used for "dope" buckets by the motive power department.

I find in painting some of our stations that by touching up parts of the building where it is needed and finishing with a coat of fairly heavy color, well rubbed out, I will secure just as good and lasting a job as two coats would. This makes a big saving in labor and material. Nearly all stations have a heavy overhead projection which protects the building down to within a few feet of the ground or platform. Consequently the touching up is only required around the lower part of the building.

On bridges, especially deck-plate girders, while the upper surface of all bottom flange angles and the tops of girders need attention, we frequently find the web in good shape. In this case it would be a waste of labor



H. E. CONRAD
Vice-President

and material to first-coat the entire structure. We thoroughly clean all parts that require it and keep it coated up as fast as cleaned, and when thoroughly hard, coat the structure solid.

The first of this year we were advised that the railroad was receiving the highest prices ever known for scrap material and were asked to use every effort to collect all scrap, no matter how small. In doing the road work last spring we collected an average of 100 lb. per day without spending any time looking for it. We carried a box on the motor car in which we put this scrap, and when we came to a section house we would place it in the scrap bin.

In order to keep the Safety First movement in the men's minds at all times, we hold a safety first meeting in the cars one night each week. Each man has a chance to discuss the problems he has in mind, and I find that they are always looking for unsafe conditions. The Big Four has equipped all bridge and building gangs with good camp car equipment, living cars being rebuilt coaches, equipped with steel sanitary bunks, etc. Tool and material cars were built from box cars to suit each gang and all gangs were furnished motor cars. Each camp car outfit carries two portable derrails, and as soon as the cars are set out these derrails are placed on the rails. In consequence, when trainmen want to switch the cars they have to go to the man in charge of the cars to have derrails removed. When no one is with the cars the derrails must be removed and placed in the tool cars.

DISCUSSION.

M. S. Ebel (C. H. & D.) related a number of accidents resulting in injuries to men and loss of considerable quantities of paint that came about through switching crews running into painters' cars, and he expressed his commendation of the use of derrails to prevent such occurrences. In answer to a question, Mr. Jones explained that the derail locked onto the rail and that his company had adopted red lights on a stand, using 8-day burners. They had previously used a blue light stuck in the center of the track, but in this position the light was often overlooked by the train crews. He explained also that the derrails were locked with special padlocks for which the only key was in the possession of the man in charge of the car.



F. W. HAGER
Secretary-Treasurer

METAL PROTECTIVE PAINT

BY PHILIP L. MAURY,

The Sherwin-Williams Company, Cleveland, Ohio.

Inasmuch as there is a difference of opinion among some engineers and authorities relative to the selection of pigments and vehicles used in the manufacture of paints designed for the protection of metal, it seems quite useless to waste time in arguments relative to the superiority of this or that pigment or combinations of pigments, likewise the vehicles. Protection is of prime importance and is the uppermost thought with the buyer

of metal-protective paint. We will, therefore, speak of the paint as "protection," and to describe that paint, let us proceed along a definite line of analysis of what it must be according to the requirements that it must meet.

The foremost important headings or sub-divisions bearing upon the effectiveness of a paint designed for the protection of metal are (1) application, (2) wearing or service, (3) composition and (4) economy in use.

Each of these is important, and each may be further sub-divided, bringing out many other important features.

The application of a paint is dependent upon four things: (a) appearance and condition of the material in the package, (b) working or ease of application with the kind of labor usually employed, (c) proper drying of each coat, permitting application of subsequent coats within reasonable time, and (d) safety in drying and handling under average conditions. The appearance and condition of the material in the package are important because an opinion regarding the paint is often formed upon first appearance. If the paint is separated in the can, if the pigment is hard in the bottom, or if the paint appears unsatisfactory in any way, adverse opinions may be formed.

The working or ease of application of the paint is of special importance on account of the kind of labor that is usually employed for applying metal-protective paint. It is necessary that the paint be one that will spread easily in a uniform way, dry well—not only so that each coat will dry thoroughly in order that subsequent coats may be applied safely, but dry so that they will not be harmed under conditions of weather.

The wearing or the service of the paint is the important feature and is dependent upon three things: (a) the resistance to abrasion or strength of the film, (b) elasticity, and (c) imperviousness of the film to destructive agents. The resistance to abrasion or the strength of the film is dependent, in turn, upon the hard-drying of the film, its toughness, its adhesiveness and the bonding and cohesion of the several coats into one. The elasticity of the film constitutes its ability to respond to the contraction and expansion of the metal, due to the extremes of temperature, without breaking. The imperviousness of the film to destructive agents depends upon the thickness of the film and its non-porosity, which enable it to exclude air, gases and moisture, and if these are kept away from the metal the main purpose of the paint has been fulfilled.

The composition of the paint is of importance in arriving at its purpose, but the composition should interest the purchaser only in his confidence in the manufacturer and his faith in the manufacturer's ability to choose the proper raw materials. Therefore, the "Composition" may be divided into three headings: (a) designing the product, (b) raw material, and (c) assembling or manufacture. Designing the product gives a clear conception of what must be accomplished by the paint, and also the capabilities of the designer through his general knowledge and ability. The raw materials are divided into two classes, solids or pigments and fluids or vehicles. These must be selected through test or otherwise by the designers to meet the requirements.

The fourth important division of a metal-protective paint is economy, which is measured by the cost per unit, which may be the cost per car, or cost per ton of steel, or the cost per 100 ft., per yard, per year or per whatever term may be chosen in which to express the cost for comparison with other figures. This cost per unit is the cost of the material plus the cost of the labor

for application, divided by the term of service—the term of service being the time elapsing between the first application and the time when it becomes necessary to renew the coating.

DISCUSSION.

Mr. Maury supplemented his paper by an informal talk on the co-operation which the paint advisory committee to the Council of National Defense had given the Government in formulating the specifications for paint used on various kinds of war equipment. Owing to the present scarcity of a great many ingredients formerly used in paint, it was necessary to make many substitutions, resulting in the production of much cheaper paint for Government use and the conservation of the raw paint materials for uses where substitutes are prohibitive.

OTHER PAPERS

C. H. Hall, general superintendent, Patten Paint Company, Milwaukee, Wis., read a paper on "Painting Interior Walls." Owing to lack of space this will appear in a later issue. It has also been necessary to defer the publication of a committee report on "Painting Steel Bridges." A paper by C. F. Loweth, chief engineer, Chicago, Milwaukee & St. Paul, dealt with abstract features of the master painter's duties and was designed to give him a broader view of life.

MATERIAL SITUATION.

Edward H. Brown, editor of the *Painters' Magazine*, gave an extemporaneous talk on the present paint material situation. He said that the present estimate for the flaxseed crop of the United States was 11,000,000 bu., whereas the normal consumption for the manufacture of linseed oil was 29,000,000 bu. The average annual production of flaxseed in this country is about 16,000,000 bu., the deficiency being made up ordinarily by seed produced in Argentine. However, the last South American crop was a virtual failure and the shortage is a most serious one. China wood oil and other oils that may be used as substitutes in some cases are also scarce owing to inadequate shipping and other reasons. Soya beans and sunflower seeds, the cultivation of which has been encouraged in this country for the production of substitute oils, are so much in demand for food that they do not help the paint oil situation to any extent.

Zinc white is practically out of the market, as the Government is now requiring it to be conserved for use in automobile tires. Whiting from which putty is made is also scarce, as it has not been imported for over six months owing to the diversion of shipping in favor of products considered more essential at the present time.

IMPORTANCE OF MAINTENANCE PAINTING.

W. S. Lacher, managing editor, *Railway Maintenance Engineer*, Chicago, spoke on the lack of reliable information concerning the amount of painting done by the railroads, particularly in the maintenance of way department, and that in consequence little information was at hand concerning the importance of the work done under the direction of the maintenance of way master painters. He presented some figures indicating the approximate amount of paint used by the railroads in maintenance work, and urged the gathering of more accurate data from which more reliable conclusions could be drawn. Following a discussion of this matter, the president was authorized to appoint a committee to investigate the subject.

PAINTING DANGER LINES ON PLATFORM.

An informal discussion was held of the practice of a few railroads to paint a line on the platforms of rail-

way stations to indicate a safe limit for passengers to stand when trains were entering the station. William Dunston (D. M. & N.) said his road painted these lines vermilion red with the words, "danger zone." E. H. Brown (*Painters' Magazine*) said that while red is the usual danger sign, many people do not see red plainly because of defective eyes, and moreover, vermilion turns black with age. J. Grimstead (M. C.) said that his road used white lines 4 ft. 6 in. from the outside edge of the rail with the words "danger line." H. E. Conrad (P. R. R.) used white, after trials with red, white and black, but had recently received orders to discontinue the practice. Other discussion brought out the fact that white would not be suitable on a concrete platform and that paint in such service did not last very long. For instance, a line painted with half white lead and half whiting in pure linseed oil had to be renewed every six weeks to be effective. Discussion of this subject closed with the passage of a resolution favoring the use of a white line on station platforms as a safety measure.

QUESTIONS AND ANSWERS.

One of the last features of the program was a discussion of questions submitted during the course of the convention by various members, answers being given by members of a committee. W. S. Lacher gave an outline of the principles of the bonus system with special reference to its application to railroad work, particularly track maintenance. H. E. Conrad, master painter, Pennsylvania Railroad, Huntingdon, Pa., stated that the bonus system had recently been applied to track work on the Pennsylvania and that he was now at work on time studies, designed to apply it to painting. Another subject discussed was the protection of steel decks on track scales, in the course of which H. F. Jones stated that he had secured the best results by three coats of red lead, covered with a coat of graphite, the last two coats being sanded. This proved expensive, but gave very good results. The painting of concrete mile posts and other roadway signs was discussed, and the conclusion was reached that there was no difficulty if the concrete was thoroughly cured before the paint was applied. The scarcity of flaxseed for the manufacture of linseed oil led to considerable discussion, some members being of the opinion that the industry would adjust itself to the new conditions, while others believed that the situation was serious. Attention was directed to the need of employing great care in the use of any substitute or adulterated oils.

CLOSING BUSINESS.

Election of officers resulted in the following selections: President, H. E. Conrad, master painter, Pennsylvania Railroad, Huntingdon, Pa.; first vice-president, H. F. Jones, Cleveland, Cincinnati, Chicago & St. Louis, Wabash, Ind.; second vice-president, Ole Stubstad, master painter, Chicago & North Western, Winona, Minn.; secretary-treasurer, F. W. Hager, Ft. Worth & Denver, Ft. Worth, Tex. Chicago was selected as the place for the next meeting, which will be held October 15 to 17, 1918.

PRIORITY REGULATIONS

AS a result of the war there is a larger demand for certain materials, notably iron and steel, that it is possible to supply at the present time. This has brought about a condition which required definite regulation and in order to take care of the situation properly a committee has been appointed known as the Priority Committee of the War Industries Board of the Council of National Defense at Washington, to determine the rela-

tive importance of the various orders received by the manufacturers of materials in great demand. Judge Robert S. Lovett, chairman of the executive committee of the Union Pacific, has been made chairman of this committee. The other seven members are Army and Navy officers and civilians.

All orders for work have been divided into three general classes: A, B and C, with sub-classes A1, B1, etc., to indicate their relative urgency. Class A comprises war work or orders for work necessary to carry on the war; Class B covers work which, while not designed for the prosecution of the war, is of public interest and essential to national welfare. Class C comprises all orders and work not covered by classes A and B. The rules under which priority of orders is to be secured has been formulated into a circular and about 25,000 copies of this circular were sent to manufacturers in all parts of the United States. All orders placed after September 21 are classed as Class C unless covered by certificates of the Priorities committee or other written directions of the committee.

The committee has recognized the indispensable character of the service performed by the railroad and has generally followed the practice of classifying materials needed by railroads as next in importance to actual war materials and in general they have been given a Class B1 rating. This is the highest rating that can be given to anything which is not included under the head of actual war work.

All applications are passed on individually, however, and rated according to their merits, so that a request from a road that could show that the materials were needed for a purpose that would have a direct effect in enabling it to handle war traffic would be classed as of greater importance than a similar request from a road that could not show so direct a connection with a war emergency.

Many applications for priority certificates have already been presented to and acted on by the Priorities committee. Under the present practice they are referred to a member of the committee for examination or investigation, and they are acted upon after he has submitted his recommendations at a meeting of the committee, which holds daily meetings so that applications may be passed upon promptly.

PROPOSED FREIGHT RATE INCREASE

THE hearings of the Interstate Commerce Commission on the 15 per cent increase in freight rates asked by the railroads were held in Washington from November 5 to 17 inclusive. Statements before the commission were made by a number of railway presidents and by George S. Patterson, chairman of the committee of lawyers acting for the eastern roads. The railroads presented statistics to show that their operating expenses are increasing so much faster than the gross earnings that the net earnings are much less in spite of the enormous increase in business. Thus Mr. Patterson stated that the gross earnings for the first nine months of 1917 had risen \$123,789,000, while there was an increase of \$168,431,000 in expenses, thus leaving the railroads \$57,291,000 less net earnings than they had for the corresponding period in 1916. One of the important items of expense pointed out as being greater this year than last is that of fuel. On the Pennsylvania system, for example, the average cost in 1916 was \$1.23 a ton, while the government price is now \$2.45, higher by 5 cents than the price paid during the last six months before any attempt was made to control prices. The labor problem was mentioned as a matter of concern.

THE MATERIAL MARKET

THE fixing of prices by the government and the priority regulations of orders is gradually bringing about a marked change in conditions in the iron and steel market. On November 5 a further extension of the fixed prices was announced to cover wrought pipe, cold rolled steel sheets, tin plate, wire and four grades of scrap. Shortly previous to this announcement the Iron and Steel Institute issued a list of extras and differentials on the commodities previously covered by fixed prices so that the price control would be placed on a more workable basis. Outside of structural steel, wrought pipe and scrap, the railroads have not been benefited thus far by a price fixing. However, it is expected that an adjustment of prices will take place which will put finished and semi-finished materials in a more nearly correct relation to the base prices established.

In the meantime the purchases by the railroad have been so small that the prices now quoted on many items are merely nominal. The prices given are as follows: Angle bars, 3.25 cents to 4 cents per lb.; spikes, 4½ cents to 5½ cents per lb.; track bolts, 5.25 cents and upwards per lb. All of these prices are the same as those given a month ago with the exception of those on track spikes, where the price is now appreciably lower. The rail situation still remains unsolved. One road recently received quotations as high as \$75 on an inquiry for 14,000 tons of standard rails.

Consequent to the fixing of prices on wire there has been a material reduction in the quotation on wire products. Thus wire nails have been reduced from \$4 per 100 lb. to \$3.50; plain wire from \$3.95 to \$3.25 Pittsburgh; galvanized wire from \$4.45 to \$3.95 Pittsburgh, and galvanized barbed wire from \$4.85 to \$4.35. In structural steel the railway orders for the month include 500 tons for the Pennsylvania Railroad and 1,500 tons for the Philadelphia & Reading. As one bridge company officer expressed it, the bridge shops are building ships now, not bridges.

In the scrap market a long period of quiet has been followed recently by more active buying and the establishment of the new government prices will no doubt result in a freer movement of old material. The fixed prices are \$30 per ton on No. 1 heavy melting scrap, \$20 for cast iron parings and machine shop turnings, and \$35 for railway wrought scrap. These prices, while materially lower than those prevailing some time ago, are practically equal to the average prices obtaining at the time that they went into effect. Typical prices at present on old railway materials include frog and switch scrap at \$27 to \$28 per ton, rerolling rail at \$31 to \$37 and relaying rails at \$45 to \$75.

Concrete materials, particularly sand, stone and gravel, will be increasingly hard to get on account of the recent restriction placed on the use of open top cars for other than coal and ore traffic. This rule has put a stop to a considerable amount of concrete work, but as it comes at a time of the year when less construction is under way, the condition is not so serious. Cement is not materially effected by this order, although the movement of cement is necessarily dependent largely on the movement of the other concrete materials. Cement prices have not changed since August and the prices per bbl. given are \$1.81 for Chicago, \$1.91 for Pittsburgh, \$2.00 for Detroit and Toledo, \$1.93 for Milwaukee and Peoria, \$2.08 for St. Paul and Minneapolis.

Little change has taken place in the lumber market. The prices of Douglas fir have remained stationary, while some small increases have taken place in yellow pine.

GENERAL NEWS DEPARTMENT

THE CHAMBER OF COMMERCE of the United States reports an overwhelming vote in favor of laws for federal regulation for the issuance of railway securities in its referendum concerning proposed railroad legislation.

THE STATE LEGISLATURES passed 140 laws relating to railway operation in 1917. These laws related to conditions of employment, trespassing, elimination of grade crossings, car service and a wide variety of other subjects.

THE CANADIAN PACIFIC, following a report of a Board of Conciliation, has advanced the pay of trackmen 30 cents a day on the western lines and 40 cents a day on the eastern lines. Foremen are advanced 15 cents a day, their wages now being \$3.25, \$3.40 and \$3.60.

THE CHICAGO, MILWAUKEE & ST. PAUL has announced that it has been decided to hasten the completion of the electrification of its line from Othello, Wash., to Seattle and Tacoma because of the saving in fuel it will effect. The section now being electrified is 211 miles long. This road already has in operation electrically the 440 miles of its main line between Avery, Idaho, and Harlowton, Mont.

W. C. ADAMSON, author of the Adamson "eight-hour" law asked "what do we want with government ownership of railroads when we have something far better in this country right now," when questioned in a recent interview at Denver, Colo. "Government ownership of railroads is not only a fallacy, but is entirely without an excuse for having a champion in the United States at this time."

C. A. PROUTY, director of valuation, stated recently in an address before the National Association of Railway Commissioners that the government had expended about \$9,500,000 on valuation work up to October 1 and that the appropriation for the present fiscal year is \$3,500,000. He stated that he still hopes that the cost to the government will not exceed his original maximum estimate of \$20,000,000.

THE NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS estimates that there are 200,000 grade crossings in the United States, only 10 per cent of which are protected by gates, flagmen or bells. It is estimated that the elimination of these crossings would cost \$30,000 each in California, \$40,000 in Colorado and \$48,000 in New York. The committee which presented this report advocated that each state ought to have a law making some progress in the elimination of grade crossings each year, and that the cost should be divided about equally between the railroads and the public.

THE CHICAGO & NORTH WESTERN and the Chicago, Burlington & Quincy have elected to operate under the provisions of the Wisconsin workmen's compensation act and have filed certificates. This means that the law will apply to shop men, section hands and all other employees of these roads except those engaged in interstate commerce, whose rights to recovery when injured are governed by the federal employers' liability law. Heretofore only the Minneapolis, St. Paul & Sault Ste. Marie and the Great Northern have been subjected to the Wisconsin workmen's compensation act.

THE BUREAU OF MINES, Department of the Interior, has put into effect a law passed by the last Congress, which provides that everyone who handles explosives must have a license. Any person in the United States found with explosives in his possession after November 15, and who does not have a license issued by the federal government, showing the purpose for which the explosives are to be used, will be arrested at once and may be fined up to \$5,000 or sent to prison for one year, or both. Railways, contractors and others using large quantities of explosives may issue explosives to their employees only through those employees holding a license, called a foreman's license. Francis S. Peabody, Chicago, has been appointed to act as as-

sistant to the director of the Bureau of Mines, Van H. Manning, in enforcing this law.

THE NEW YORK, NEW HAVEN & HARTFORD reports that 893 of its employees have volunteered since war was declared. The total number of men in the operating department already called before their local boards is 1,583, while the number drafted is equal to 4.9 per cent of those available for service. Employees entering military or naval service are considered as on authorized leave of absence and they will retain their seniority rights if exercised within 60 days after date of discharge from government service, and if their physical condition is such as to permit them to resume their former duties.

THE THREE 300-FT. SPANS of the St. Joseph & Grand Island bridge across the Missouri river at St. Joseph, Mo., were moved 136 ft. longitudinally at 11:30 on November 14 to make room for a new draw span, new piers having previously been built to receive the spans. The movement was completed in 13 min. without accident of any kind. Other operations, including the tearing out of a temporary structure to permit the moving of the spans and the construction of a trestle to fill the gap between the draw span and the first span adjacent, occupied the time from 8 a. m. until 5:30 p. m. All changes were completed according to schedule.

THE SOUTHERN PACIFIC employees in the maintenance of way department subscribed heavily for the second liberty loan. One foreman of a bridge and building gang on the Portland division subscribed for \$18,000 bonds and paid for them in cash. Twelve Japanese section hands in a gang on the Tillamook branch in Oregon each subscribed for a \$100 bond, while a group of Chinese section hands employed in what is known as the "forty-mile desert" were among other subscribers, some of the men in the latter gang being among the last of the original workers who helped to build the Central Pacific between Ogden and San Francisco.

T. J. FOLEY, vice-president in charge of operation of the Illinois Central, estimates that if the speed restrictions imposed by municipalities were removed the railroads could haul 4,373,952 additional freight cars a distance of 100 miles, or 75,023,520 additional tons of freight a distance of 100 miles in the course of a year. He cited the Illinois Central system as an example, stating that there are 480 speed restrictions, the greater majority of which limit freight trains to six miles per hour. He pointed out that these restrictions are unreasonable in most instances, and that the loss of time complying with them on this one road is equivalent to a day's work of 49,883 men each year.

THE PUBLIC SERVICE COMMISSION of New Hampshire in a ruling in the case of the city of Manchester, Mass., versus the Boston & Maine, regarding compulsory grade separation, took a very definite stand on the character of railway improvements to be conducted during the war, stating in part as follows: "But above and controlling all other considerations is the fact that this country is now in a state of war, and among the most important instrumentalities for the successful conduct of the war is our railroad system. Every effort is being made to coordinate the railroads of the country into a single system, under a single head, in such wise as to make available for each, as needed, the resources of all. The strain laid upon the railroads by the demand made upon them for the transportation of men, materials and supplies is stupendous. * * * We do not say that we will in no case order expenditure by our railroads not directly promotive of the conduct of war. But it should be understood that so long as the public receives a service reasonably approximating that to which it was accustomed in times of peace and where the public safety is not manifestly and imminently in danger, we cannot be expected to order our railroads to expend large sums of money on improvements having no tendency, directly or indirectly, to enable them to carry on war business."

PERSONAL MENTION

GENERAL

S. S. LONG, division engineer of the Wisconsin division of the Chicago & North Western, with headquarters at Chicago, has been promoted to assistant superintendent at Winona, Minn.

GEORGE C. KOONS, assistant engineer maintenance of way in charge of bridges and structures of the Pennsylvania Railroad at Philadelphia, Pa., has been appointed assistant superintendent



GEORGE C. KOONS

of the New York division, with office at Jersey City, N. J., succeeding J. M. Henry, recently appointed assistant general superintendent of motive power lines east of Pittsburgh. Mr. Koons was born in Middletown, Pa., June 24, 1872. He received his education in the Reading, Pa., high school, from which he graduated in 1889. He entered the service of the Pennsylvania in 1896 as a draughtsman on the Schuylkill division. In 1899 he was made transitman at Altoona and on January 1, 1900, he was appointed assistant supervisor in the Altoona Yard. He subsequently served as assistant supervisor on the Middle and the Pittsburgh divisions. In May, 1901, he was made assistant supervisor of signals on the Philadelphia division and on January 1, 1902, he was transferred to the Pittsburgh division. On February 1, 1902, he was appointed supervisor on the Monongahela division, and subsequently served as supervisor at Altoona, and on the Middle and Pittsburgh divisions. On June 16, 1913, he was appointed assistant engineer maintenance of way in charge of bridges and structures, which position he held until his recent appointment as assistant superintendent.

ROBERT S. PARSONS, assistant to the president and chief engineer of the Erie, with headquarters at New York, has been appointed assistant to the president and general manager of that road, the New York, Susquehanna & Western, and affiliated lines. He will also continue in charge of maintenance and construction, with headquarters at New York. Mr. Parsons was born at Hohokus, N. J., and was educated at Rutgers College. He began railway work as a rodman on the Erie in 1895, the following year he was made assistant engineer, and in 1899 he became division engineer of the New York, Susquehanna & Western. In 1903 he was appointed engineer maintenance of way of the Erie, and three years later became assistant general superintendent. He was appointed superintendent of the Susquehanna division in 1907, and three years later



ROBERT S. PARSONS

was transferred in the same capacity to the New York division. On January 1, 1913, he was appointed assistant general manager

of the lines east of Buffalo, N. Y., and Salamanca, with headquarters at New York. One year later he was appointed general manager of the Ohio Grand division, now known as the Erie Lines West, with office at Cleveland, Ohio, and in January, 1916, he was appointed chief engineer, and in the following September he was made assistant to the president and chief engineer.

H. B. TITCOMB, whose appointment as superintendent of the Stockton division of the Southern Pacific was mentioned in these columns last month, was born in Indianapolis, Ind., in



H. B. TITCOMB

December, 1871. He graduated from Cogswell Polytechnical College in 1891, and on July 3 of the same year entered the service of the Southern Pacific as a draftsman. He was promoted to assistant engineer, construction division, in 1898; was appointed roadmaster of the western division in 1899; and was successively roadmaster of the Shasta and Sacramento divisions from 1900 to 1904. He was assistant resident engineer from 1904 to 1905, resident engineer at San Joaquin, Cal., 1905 to 1906, and at Los Angeles, 1906 to 1909. He was district engineer, with headquarters at Los Angeles, from 1909 to 1914; and maintenance of way assistant to the assistant chief engineer, San Francisco, from 1914 to October 15, 1917, when he was promoted to superintendent of the Stockton division.

H. H. RUSSELL, division engineer of the Pittsburgh division of the Pennsylvania Railroad at Pittsburgh, Pa., has been promoted to assistant superintendent of that division, with headquarters at Youngwood, succeeding J. B. Hutchinson, who has been promoted to superintendent of the Tyrone division. Mr. Russell was born at Jersey Shore, Pa., on March 10, 1872, and was educated at the Williamsport Dickinson Seminary and the University of Pennsylvania. He entered the service of the Pennsylvania in May, 1895, as a rodman in the office of the principal assistant engineer at Williamsport, Pa. He was promoted to transitman in the office of the assistant engineer at Altoona in July, 1899, and on January 1, 1900, he was made assistant supervisor at Parkton, Md., on the Baltimore division. On January 1, 1901, he was transferred to the Philadelphia division at Paoli, Pa., and on June 15 of the same year, he was moved to New Florence, Pa., on the Pittsburgh division. He was promoted to supervisor in charge of the Frederick division at Columbia, Pa., on April 15, 1902. He was transferred to the Philadelphia terminal division in November, 1903, and again in June, 1905, to the Maryland division at Lamokin, Pa. He was advanced to division engineer of the Allegheny division at Oil City November 1, 1907, and on June 16, 1913, he was transferred to the Middle division at Altoona, Pa. On April 15, 1917, he was transferred to the Pittsburgh division, where he remained until appointed as assistant superintendent, as noted above.



H. H. RUSSELL

Philadelphia division at Paoli, Pa., and on June 15 of the same year, he was moved to New Florence, Pa., on the Pittsburgh division. He was promoted to supervisor in charge of the Frederick division at Columbia, Pa., on April 15, 1902. He was transferred to the Philadelphia terminal division in November, 1903, and again in June, 1905, to the Maryland division at Lamokin, Pa. He was advanced to division engineer of the Allegheny division at Oil City November 1, 1907, and on June 16, 1913, he was transferred to the Middle division at Altoona, Pa. On April 15, 1917, he was transferred to the Pittsburgh division, where he remained until appointed as assistant superintendent, as noted above.

A. B. CUTHBERT, principal assistant engineer on the Eastern Pennsylvania division, Pennsylvania Railroad, has been appointed acting superintendent of the Cresson division, with headquarters at Cresson, succeeding F. W. Smith, temporarily assigned to other duties.

GEORGE PEEBLES MILLER, who has been promoted to assistant superintendent of the Delaware and Raritan Canal, a subsidiary of the Pennsylvania Railroad, receiving his training in the maintenance of way department, entering railway service with the Pennsylvania as a rodman in April, 1887. In 1889 he was transferred to the assistant engineers' office and in 1890 to the office of the engineer maintenance of way at Altoona, Pa. He was made assistant supervisor in January, 1892, and the same year was transferred to signal work, where he remained until 1894, when he was made supervisor of signals. In 1901 he was promoted to assistant engineer, holding this position on a number of divisions, and in 1909 was promoted to principal assistant engineer of the New Jersey division, where he remained until his recent appointment.

W. B. McCALEB, superintendent of the Philadelphia division of the Pennsylvania Railroad, has been promoted to general superintendent of water companies to succeed the late George S. Cheyney. He entered the service of the Pennsylvania as a rodman in the engineering corps on the Pittsburgh division in 1880. He was promoted through various positions in that department and in April, 1883, was made assistant supervisor. He was promoted to supervisor at Tyrone in October, 1886, was later made assistant engineer and on October 1, 1895, was appointed superintendent of the Bedford division. On December 10, 1896, he was transferred to the Sunbury and Shamokin division and on May 1, 1902, to the Midland division at Harrisburg. Upon transfer of headquarters, he was made superintendent of the Philadelphia division, June 1, 1903, remaining at Harrisburg.



W. B. McCaleb

ENGINEERING

J. C. PICKENS, assistant engineer on the Atlantic Coast Line at Rocky Mount, N. C., has been appointed division engineer at Richmond, Va., succeeding M. S. McDanel, resigned.

A. A. CROSS has been appointed assistant engineer of the New York, New Haven & Hartford, with headquarters at New Haven, Conn., succeeding E. O. Carlson, who has entered military service.

J. A. HEAMAN, assistant to the chief engineer of the Grand Trunk Pacific at Winnipeg, Man., has been appointed assistant chief engineer, and the position to chief engineer has been abolished.

F. B. ROWELL, engineer of real estate of the Boston & Maine, with headquarters at Boston, Mass., has been appointed research engineer. JOHN B. RUSSELL, chief draftsman of the valuation department, succeeds Mr. Rowell.

E. C. WIGHT, district bridge inspector on the Maryland district of the Baltimore & Ohio, with headquarters at Baltimore, Md., has been promoted to division engineer at Wheeling, W. Va., succeeding B. A. Beatty, resigned.

FRANK LEE, principal assistant engineer of the Canadian Pacific Western Lines at Winnipeg, Man., has been appointed engineer maintenance of way, Eastern Lines, with headquarters at Montreal, Que., succeeding A. C. MacKenzie, who replaces Mr. Lee at Winnipeg.

R. H. PINKHAM, division engineer of the Renovo division of the Pennsylvania Railroad, with headquarters at Erie, Pa., has been transferred to the Pittsburgh division, to succeed H. H. Russell, promoted to assistant superintendent.

GEORGE H. BROWN, division engineer of the Philadelphia division of the Pennsylvania Railroad, with headquarters at Harrisburg, Pa., has been appointed acting principal assistant engineer of the eastern Pennsylvania division, succeeding A. B. Cuthbert.

J. C. HACKENBERG, division engineer of the Allegheny division of the Pennsylvania Railroad, with headquarters at Oil City, Pa., has been transferred to the Maryland division at Wilmington, Del., in place of J. R. McGraw, who has been granted a leave of absence.

L. L. SPARROW, engineer of roadway of the Atlantic Coast Line, with headquarters at Jacksonville, Fla., has been appointed office engineer, with office at Washington, N. C. H. G. LAIRD, superintendent of timber preservation at Gainesville, Fla., succeeds Mr. Sparrow.

F. W. HILLMAN, assistant engineer on the Chicago & North Western, has been appointed division engineer at Madison, Wis., succeeding Lee Jutton, transferred to the Wisconsin division, with headquarters at Chicago, in place of S. S. Long, promoted to assistant superintendent.

S. E. SHOUP has been appointed acting division engineer of the Kansas City terminal division of the Kansas City Southern, with headquarters at Kansas City, Mo., succeeding A. Leckie, division engineer, who has been temporarily assigned to other duties, effective November 1.

GALEN B. OWEN, superintendent of maintenance of the Erie, with headquarters at New York, has been promoted to chief engineer of this road, succeeding R. S. Parsons, who has been appointed general manager. A sketch of Mr. Owen's railway life appeared in the *Railway Maintenance Engineer* for May, 1917.

H. KNIGHT, assistant superintendent of maintenance of the Erie, with headquarters at New York City, has been advanced to superintendent of maintenance, succeeding Galen B. Owen, who has been made chief engineer of this road. A sketch of Mr. Knight's railway career was published in the *Railway Maintenance Engineer* for May, 1917.

G. W. CORRIGAN, division engineer of the Stockton division of the Southern Pacific at Stockton, Cal., has been appointed division engineer of the San Joaquin division, with headquarters at Bakersfield, Cal., succeeding J. P. Edwards, who has resigned. J. B. Dawson has been appointed division engineer of the Stockton division, succeeding Mr. Corrigan.

S. F. SHAW has been appointed chief engineer of the International Railways of Central America, with headquarters at Guatemala City, Guatemala, in charge of engineering, additions and betterments and right-of-way in Guatemala, succeeding E. H. Stewart, who has resigned to go to another company. C. R. CHANDLER, assistant engineer at Guatemala City, has been appointed engineer maintenance of way.

H. H. TEMPLE, who was appointed chief engineer of the Pittsburgh & West Virginia and West Side Belt, effective October 22, 1917, entered the service of the Baltimore & Ohio Southwestern in February, 1899, as assistant engineer. In December of the same year he was appointed resident engineer, in charge of construction work on the Springfield division. He served as signal engineer with the same road from March, 1901, to March, 1902, and as division engineer from March 1902, to April 1, 1903. On the last date he was transferred to the Baltimore & Ohio, on the Connellsville division, in the same capacity, and in December, 1903, to the Pittsburgh division. In June, 1905, he was promoted to engineer maintenance of way of the Pittsburgh division, which position he held until January 1, 1907, when he became superintendent of the New Castle division of the lines west. On March 1, 1914, he was appointed superintendent of maintenance of way, in charge of construction and maintenance, of the San Antonio & Aransas Pass.

GEORGE W. SNYDER, principal assistant engineer of the western Pennsylvania division of the Pennsylvania Railroad, with office at Pittsburgh, Pa., has been appointed assistant engineer maintenance of way, in charge of bridges and structures at Philadelphia, succeeding George C. Koons, promoted to assistant superintendent. He was born in Pottsville, Pa., on January 9, 1866. He was educated in the public schools at Pottsville, and by a private tutor, and at Lehigh University. He entered the service of the Pennsylvania as a rodman on the Renova division on November 1, 1884. He was appointed assistant supervisor of the Renova division on January 1, 1886, and was advanced to supervisor on that division on August 1, 1890. He subsequently served as supervisor at Baltimore, Md., and at Altoona, Pa. On January 1, 1901, he was appointed division engineer of the Monongahela division, and was transferred to the Pittsburgh division in June, 1903. In April, 1907, he was advanced to principal assistant engineer.

H. W. WAGNER, who has been promoted to chief engineer of the Atchison, Topeka & Santa Fe, eastern lines, with headquarters at Topeka, Kan., as was announced in these columns last



H. W. WAGNER

month, was born at Boone, Ia. After graduating from the engineering school at Kansas University, he entered the service of the Santa Fe in May, 1897, as chairman in the maintenance department at Newton, Kan., and was promoted to rodman and later to transitman in May, 1900. He left the Santa Fe to go with the Union Pacific on relocation, change of line and new location work on that road and the Oregon Short Line, starting as levelman and later being promoted to transitman, and then locating engineer. He returned to the Santa Fe in 1902 as division engineer at Arkansas City, Kan., being transferred later to Marcelline, Mo., and La Junta, Colo.; from May, 1909, to January, 1910, he was division engineer on construction, and from June, 1910, to April, 1913, principal assistant engineer at Amarillo, Tex., on which latter date he was promoted to district engineer at La Junta, which position he held until his appointment as chief engineer, effective October 15, succeeding R. A. Rutledge, transferred to La Junta on account of ill health.

C. B. BRINSER, division engineer of the Middle division of the Pennsylvania Railroad at Altoona, has been transferred to the Pennsylvania Terminal division in place of W. T. Covert; A. W. McCLELLAN, division engineer of the Williamsport division, with headquarters at Williamsport, Pa., has been transferred to the Middle division, succeeding Mr. Brinser; ROBERT C. FARIES, division engineer of the Elmira division, at Elmira, N. Y., has been transferred to Williamsport, succeeding Mr. McClellan. C. M. WISMAN, supervisor on the New York division, with headquarters at Trenton, N. J., has been promoted to division engineer of the Elmira division, with headquarters at Elmira, N. Y., in place of Mr. Faries.

H. R. MANBY, acting superintendent and engineer maintenance of way of the Tennessee Central, has been appointed superintendent and engineer maintenance of way, with headquarters in Nashville, Tenn. Mr. Manby was born in West Liberty, Iowa, on February 15, 1880, and graduated from high school at Rockwell City, Iowa, in June, 1900. The following month he entered the service of the Chicago, Milwaukee & St. Paul. From June, 1901, to October, 1903, he was a track apprentice, chairman and rodman on the Illinois Central; from the latter date to December, 1905, he was an assistant engineer on the Tennessee Central, when he became an assistant engineer on the Nashville Terminal, being promoted to engineer in August, 1907; from July, 1908, to October, 1909, he was an assistant

engineer, and from October, 1909, to October, 1910, a track supervisor on the Tennessee Central. He then entered the service of the Seaboard Air Line as engineer-inspector and remained on that line until November, 1912, when he returned to the Tennessee Central as assistant engineer. In March, 1913, he was promoted to engineer maintenance of way, and in March, 1917, he became also acting superintendent.

JOHN ATLEE, who has been a supervisor on the Pittsburgh division of the Pennsylvania Railroad, with headquarters at East Liberty, Pa., has been promoted to the position of division



JOHN ATLEE

engineer of the Renova division, with headquarters at Erie, Pa. He will succeed R. H. Pinkham, who has been transferred to the Pittsburgh division to serve in the same capacity. Mr. Atlee was born in 1873, and after receiving his education in the public schools of Philadelphia, he entered the service of the Pennsylvania Railroad in 1902 as a rodman in the engineering department. He subsequently served in various capacities on a number of divisions of the system, being in turn transitman, assistant supervisor and supervisor, before receiving his appointment to the position of division engineer, as noted above.

E. J. AYARS, supervisor on the Baltimore division of the Pennsylvania at Bowie, Md., has been promoted to division engineer of the Allegheny division, with office at Oil City, succeeding J. C. Hackenberg, transferred to the Maryland division, as noted elsewhere. He was born September 19, 1876, and was graduated from Delaware College in 1900. He entered the service of the Pennsylvania as a rodman in the division engineer's office of the New York division on August 15, 1900. He was made transitman at Altoona, Pa., on September 1, 1903, and was promoted to assistant supervisor on the Media division on November 25, 1903, and on August 1, 1905, he was transferred to West Philadelphia. On July 15, 1907, he was promoted to supervisor at Shamokin, Pa., and subsequently served in a similar capacity at Morristown, Pa., East Aurora, N. Y., and at Bowie, Md.

W. T. COVERT, division engineer on the Pennsylvania Railroad at West Philadelphia, Pa., has been promoted to principal engineer of the Western Penn-



W. T. COVERT

sylvania division, with headquarters at Pittsburgh to succeed Geo. W. Snyder promoted to assistant engineer maintenance of way. Mr. Covert was born in 1873 at Philadelphia, where he received his early education. He entered the services of the Pennsylvania in 1890 as a clerk, being transferred later to the maintenance of way department as a rodman. He was employed for several years in New Jersey and New York City, taking a course at Cooper Institute in the meantime. In June, 1897, he was promoted to assistant supervisor on the Philadelphia division at Paoili, and was advanced to supervisor in July, 1900. In April, 1907,

he was made assistant engineer on the Chautauqua division and in March, 1911, he became division engineer.

TRACK

GEORGE DUDLEY has been appointed roadmaster of the Yosemite Valley, in charge of track, bridges and buildings, with headquarters at Merced, Cal., succeeding E. H. Nickerson, chief engineer, resigned.

W. H. DURBIN of Lubbock, Tex., has been appointed roadmaster of the second district, Illinois division of the Atchison, Topeka & Santa Fe, with headquarters at Chillicothe, Ill., succeeding Jacob Haas, who has been transferred.

GUSTAVE DARROW, general foreman of the Chicago & North Western, whose appointment as roadmaster, with headquarters at Ironwood, Mich., was announced last month, entered railway service as a section laborer for the Chicago & North Western in April, 1899. In September of the same year he was made foreman, and in March, 1916, he was promoted to general foreman.

C. C. WARREN, who has been appointed division roadmaster of the St. Louis Southwestern of Texas, with headquarters at Tyler, Tex., was born at Arcola, Ill., on March 30, 1868. He entered the service of the St. Louis Southwestern of Texas in October, 1888, as section foreman and continued as track foreman in various capacities until October, 1903, when he was promoted to assistant roadmaster, which position he held until his promotion to roadmaster, effective October 5, 1917.

C. A. MAYNOR, who has been appointed roadmaster of the Illinois Central, with headquarters at Water Valley, Miss., was born at Jackson, Miss., on March 17, 1874. After completing grammar school at Jackson he entered the service of the Illinois Central as a track apprentice on March 1, 1894. He was promoted to section foreman on October 1, 1894, and to supervisor on the Louisiana division on February 1, 1905, serving in the latter capacity to September 1, 1917, when he was appointed roadmaster on the Mississippi division.

W. S. JOHNS, JR., supervisor on the Pennsylvania Railroad at Uniontown, Pa., has been transferred to the Baltimore division, with office at Bowie, Md., to succeed E. J. Ayars, who has been promoted to division engineer of the Allegheny division, with headquarters at Oil City, Pa. M. LIPMAN, supervisor on the West Jersey & Sea Shore at Atlantic City, N. J., has been transferred to the Pittsburgh division of the Pennsylvania Railroad, with headquarters at East Liberty, Pa., succeeding John Atlee, promoted to division engineer of the Renova division at Erie. M. DE K. SMITH, supervisor at Trenton, Pa., has been transferred to Trenton, N. J., succeeding C. M. Wisman, promoted to division engineer of the Elmira division, with office at Elmira, N. Y.

R. C. VIOLETT, who was recently appointed division roadmaster of the St. Louis Southwestern, with headquarters at Mt. Pleasant, Tex., was born at Winchester, Ill., on October 17, 1879. He entered the service of the Chicago, Burlington & Quincy in 1894, working during vacations while attending high school, until he graduated in 1898. He was promoted to extra gang foreman in 1901, and from that date to 1906 he had charge of heavy construction work on the Beardstown division. In 1906 he was promoted to roadmaster, with headquarters at Centralia, Ill. In August, 1908, he was transferred to the Galesburg division in the same capacity, and in June, 1910, to the Aurora division. He was promoted to assistant trainmaster of the Aurora division in July, 1916. His appointment as roadmaster of the St. Louis Southwestern was effective October 1, 1917.

J. E. EMOND, who has been appointed roadmaster of the Atchison, Topeka & Santa Fe, with headquarters at Vaughn, N. M., succeeding M. A. McNeil, resigned, entered the service of the Santa Fe at Olathe, Kan., on September 1, 1900, at the age of 17 years. On December 1, 1903, he was promoted to section foreman, in which capacity, and also as extra gang foreman, he worked on several divisions until August 1, 1911, when he became gang foreman at Belen, N. M. On October 1, 1911, he was transferred in the same capacity to Albuquerque, where he remained until April 1, 1912, when he was promoted to general construction foreman at Dodge City, Kan. From September 1 to December 1, 1913, he was general construction foreman for McCabe & Stein, contractors, at Denver, Colo.,

and from December 1, 1913, to April 1, 1914, he held a similar position with Kilpatrick Bros., at Wichita, Kan. On April 1, 1914, he returned to the Santa Fe, and since that time his service has been continuous as section, extra gang and general construction foreman. His promotion to roadmaster was effective October 1, 1917.

BRIDGE

J. L. CUMMINGS, division engineer on the Mobile & Ohio at Murphysboro, Ill., has been appointed acting bridge engineer, with headquarters at Mobile, Ala., in place of H. Austill, Jr., now in military service.

F. M. GRIFFITH, supervisor of bridges and buildings, and E. J. ROHER, assistant supervisor of bridges and buildings on the Chesapeake & Ohio at Covington, Ky., have also been given jurisdiction over the Cincinnati division and the Chesapeake & Ohio Northern.

PURCHASING

J. F. ESCH has been appointed purchasing agent of the Colorado Midland, with headquarters at Colorado Springs, Colo., succeeding C. N. Davids, who has resigned.

H. A. ANDERSON, special agent in the purchasing department of the Pennsylvania Railroad, has been appointed assistant purchasing agent, with headquarters at Philadelphia, Pa.

E. J. SHIELDS has been appointed general storekeeper of the Kansas City, Mexico & Orient, with headquarters at West Wichita, Kan., vice C. A. Keller, resigned to accept service with the United States Government.

R. E. SCOTT, whose appointment as purchasing agent of the Spokane, Portland & Seattle, with headquarters at Portland, Ore., was announced in these columns last month, was born July 17, 1887, at Barnesville, Minn. He graduated from the mechanical engineering department of Purdue University in 1911 and the same year entered the service of Fairbanks, Morse & Co. In 1914 he was appointed roadmaster of the Oregon Electric, which position he held until his appointment as purchasing agent, as noted above. He succeeds S. M. Clark, who has resigned.

IN MILITARY SERVICE

W. H. REAM, structural steel designer and draftsman for the Delaware, Lackawanna & Western, has received a commission as first lieutenant in the Engineer Officers' Reserve Corps.

E. O. CARLSON, assistant engineer of the New York, New Haven & Hartford from New Haven, Conn., has entered military service and is now with the Eleventh Regiment of Railway Engineers.

FRED JASPERSON, engineer of docks and construction of the Philadelphia & Reading, at Port Richmond, Philadelphia, Pa., has been commissioned a lieutenant-colonel, and has left for Russia with the special force organized for the government by the Baldwin Locomotive Works, for repair and reconstruction work of the railways in Russia.

WOOLSEY FINNEL, assistant engineer in the valuation department of the Mobile & Ohio, has been commissioned major, and H. AUSTILL JR., bridge engineer, has been commissioned captain in the Five Hundred and First Battalion, Twentieth Engineers; L. M. PILL, office engineer in the valuation department, has been commissioned captain in the Engineers' Reserve Corps.

H. C. BOOZ, assistant chief engineer of the Pennsylvania Railroad at Philadelphia, Pa., has been granted a leave of absence in order to join the American expeditionary forces in Europe, under the supervision of W. W. Atterbury, director-general of transportation. Other officers who have been granted similar leaves of absence to join the same forces include W. H. FARADAY, assistant purchasing agent of the Pennsylvania Railroad; J. A. MCCREA, general manager of the Long Island and formerly in the engineering department of the Pennsylvania Railroad, and M. C. KENNEDY, president of the Cumberland Valley.

CONSTRUCTION NEWS

THE ATCHISON, TOPEKA & SANTA FE has awarded a contract to the Swanson Brothers Contracting Company, Topeka, Kan., to build additional repair shops at Ottawa, Kan., which will cost about \$60,000.

A subsidiary of this company, the Dodge City & Cimarron Valley, is to be built from Satanta, Kan., west to the Colorado line, a distance of about 62 miles. This work will involve fairly heavy grading.

THE BUFFALO, ROCHESTER & PITTSBURGH has started work on the construction of a new engine terminal, a 16-stall roundhouse and auxiliary facilities, near Punxsutawney, Pa. The work includes changing the course of a highway from the east to the west side of the tracks for about a mile, and ten miles of additional yard tracks will be constructed. The freight transfer platform at Punxsutawney and the Ganson street freight house at Buffalo are being enlarged. It is expected that the work will be finished by the first of the year.

THE CHICAGO, BURLINGTON & QUINCY is making plans for a new freight terminal to be built on Canal street, between Harrison and Taylor streets, Chicago. A contract has been awarded to the General Wrecking & Lumber Company, Chicago, to remove the two old freight houses, while Newman & Co., Chicago, have the contract for the grading. Bids are now being asked on caisson work for the new structure.

This company is also building an addition to its inbound freight house at Omaha, Neb., the work being done by T. S. Leake & Co., Chicago. The building will be 60 ft. by 368 ft., and, including new equipment, will cost about \$60,000.

THE CHICAGO, ROCK ISLAND & PACIFIC has awarded a contract to the Railroad Water & Coal Handling Company, Chicago, for a high-pressure water system, to be installed for the protection of its elevators at South Chicago from fire.

THE GULF COAST LINES have awarded a contract to Herman Weber, Beaumont, Tex., to construct a one-story depot 34 ft. by 230 ft., at Beaumont, which will cost about \$20,000. The building will be of brick construction with reinforced concrete footings and will have a composition roof. New tracks will also be constructed and other improvements added, which will cost \$30,000 more.

THE GULF, COLORADO & SANTA FE is contemplating the construction of a freight station and a machine shop at Temple, Tex. The depot will be a two-story brick building, 32 ft. by 52 ft., with concrete foundations and a basement for a steam-heating plant. The structure will be covered with a tar-and-gravel roof. Adjoining the depot will be a freight warehouse on concrete foundations, 32 ft. by 160 ft. It will be one story in height, with tar-and-gravel roof, and will have metal rolling doors. Adjacent to the warehouse will be a covered platform 32 ft. by 54 ft. The buildings will be electric lighted, steam heated and equipped with the necessary plumbing. The estimated cost of the freight-house facilities is \$30,000. The machine shop at Temple will be 60 ft. by 100 ft., with concrete foundations, brick walls, machinery foundation, electric light, steam heat and tar-and-gravel roof. The structure will cost \$15,000, exclusive of machinery.

THE ILLINOIS CENTRAL has awarded a contract to G. A. Johnson & Son, Chicago, to make the following improvements at Memphis, Tenn.: The construction of new racks and bins in the storehouse, remodeling the mill building, erection of platforms and incline at the mill building, plumbing and sewerage work, construction of transfer table pit and engine hoist pit and the erection of a coach-yard building. This work will cost about \$50,000.

This company has also awarded a contract to T. S. Leake & Co., Chicago, for additional work at Clinton, Ill., where eleven stalls in the roundhouse will be lengthened, at a cost of about \$60,000.

This company has also awarded a contract to the Railroad

Water & Coal Handling Company, Chicago, for a 600-ton coal-ing station at Kankakee, Ill. The structure will be of timber construction with a concrete substructure. Automatic machinery will be used throughout. A contract was also awarded to the same contractor for a fire-protection system for the yards and shops at Nonconna yards (Memphis) Tenn.

THE MONONGAHELA SOUTHERN is building a 5-mile branch, to be known as the Clairton branch, from the main line of the Monongahela Southern at Bull Run, Pa., about two miles west of Duquesne to the new by-product coke plant at Wilson. The contract for the grading has been awarded to the T. A. Gillespie Company, New York and Pittsburgh; the steel superstructures to the American Bridge Company, and track laying will be handled by the railroad forces. The grading calls for the excavation of about 1,200,000 cu. yd. unclassified. There will be a tunnel 1,700 ft. long, two steel railroad bridges, 115 ft. and 430 ft. long, respectively, and four concrete arches. The amount of concrete will be about 75,000 cu. yd., including tunnel lining. The limiting grade southbound is about 1.6 per cent, northbound, 1.25 per cent compensated. The maximum curvature is 7 deg.

THE MONTANA SOUTHERN has awarded a contract to W. R. Allen, Butte, Mont., to construct a line from Divide, Mont., on the Oregon Short Line, crossing the Big Hole through Dewey and Wise River to the Elkhorn mines in Beaver Head county, a distance of about 40 miles. The work, which is about 60 per cent completed, includes light bridge work and the construction of a tunnel 210 ft. long. The maximum grade is 2½ per cent.

THE NEW YORK CENTRAL has given a contract to the Eastern Concrete Steel Company, Buffalo, N. Y., to build a concrete, brick and steel power station 34 ft. high, 60 ft. wide and 67 ft. long, at Curtis street, Buffalo.

THE OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY has let a contract to the E. J. Rounds Construction Company, Seattle, Wash., to build a roundhouse at Tacoma, which will cost about \$10,000. The building will be of frame construction with concrete pits and concrete footings supported on piles and will contain three stalls 97 ft. long.

THE PHILADELPHIA & READING plans to abolish the grade crossing at Tulip street, Philadelphia, on the Port Richmond branch; the cost of the work, which is about \$350,000, will be borne jointly by the railroad and the city. The McClintic-Marshall Company has the contract for the steel superstructure; C. P. Bowers has the contract for the concrete walls, piers and bridge floors, and waterproofing will be done by the Benjamin Foster Company.

THE PHILADELPHIA, BALTIMORE & WASHINGTON has awarded a contract to the James McGraw Company for the grading and masonry work on the Chester & Philadelphia branch now under construction to Hog Island, a distance of about 11.2 miles. Contracts for three small-span bridges on the line near Chester, Pa., have been let as follows: To the Bethlehem Steel Company for the superstructures of bridges over the Darby and Crum rivers, and to the McClintic-Marshall Company, for the superstructure for the Ridley river bridge.

THE SIOUX CITY TERMINAL is building a bridge across the Floyd river, Sioux City, Iowa, which will cost about \$39,000. E. A. Whitney, Sioux City, Iowa, has the contract for the foundation work, and the Frankman Bros. Bridge Construction Company has the contracts for fabricating and erecting the steel. It is also planned to rearrange the tracks in the Sioux City stock yards, but these plans are not yet completed.

THE SOUTHERN has authorized improvements to its passenger station at Columbus, Miss., consisting of the reconstruction of an umbrella shed with concrete pavement under it and the erection of a new baggage room and ice house.

THE TEXAS & PACIFIC has awarded a contract to the Watson Company, Dallas, Tex., to build a combination office building and warehouse at Abilene, Tex., which will cost about \$30,000. The building will be 36 ft. by 255 ft., with brick exterior, the office portion of which will be two stories high and the warehouse one story.

SUPPLY TRADE NEWS

GENERAL

THE CONSOLIDATED BOARDING & SUPPLY COMPANY, Chicago, has changed its name to the Mosher & Crawley Company.

THE BALKWILL MANGANESE CROSSING COMPANY, Cleveland, Ohio, has been formed a holding company to take over the Balkwill patents. The holding company will license crossing manufacturers to manufacture the Balkwill crossing under the Balkwill patents.

THE ILLINOIS STEEL COMPANY, the Morden Frog & Crossing Company, the American Steel & Wire Company, the Universal Portland Cement Company, the Lackawanna Steel Company, the Carnegie Steel Company, the Inland Steel Company, the Chicago Railway Equipment Company, A. M. Castle & Co., the P. & M. Company, and the A. J. O'Leary & Son Company have announced their intention in a circular letter to dispense with the sending of holiday greeting cards this year and instead to contribute the money so spent to war relief organizations. Another reason for the discontinuance of this custom is that these cards constitute a heavy burden on the country's mail service and serve no productive purpose during the war.

THE PAGE STEEL & WIRE COMPANY is the new name of the firm formerly called the Page Woven Wire Fence Company, the change having been made because of the growth and variety of products handled by the company. Beginning with wire fencing, the company has extended its activities so that it now includes many other products of high-carbon steel, among which are wire rods, rope wire and spring wire. The company also has exclusive licenses for the sale of "Armco" iron wire, made by the American Rolling Mill Company of Middletown, Ohio, and other specialties. While E. C. Sattley, general manager, will have an office at 644 Union Arcade, Pittsburgh, Pa., all correspondence for the different departments should be addressed as before, to Monessen, Pa., Adrian, Mich., New York City or Chicago.

ANNIVERSARY CELEBRATION OF TAYLOR-WHARTON IRON & STEEL COMPANY.

The one hundred and seventy-fifth anniversary of the founding of the iron industry at High Bridge, N. J., which finally developed into the Taylor-Wharton Iron & Steel Company, was celebrated in that city on October 13. The date was also the twenty-fifth anniversary of the first making of manganese steel in America, the first heat of manganese steel having been run off by the Taylor Iron & Steel Company in 1892. The introduction of manganese steel into track work by William Wharton, Jr., & Co. occurred in August 1894, a little over 23 years ago. The celebration was largely attended by officers and employees of the Taylor-Wharton Iron & Steel Company and its subsidiaries. It is estimated that 8,000 visitors were present.

The local deposits of iron ore, abundant timber for charcoal, and water power were the chief factors in locating the iron industry at High Bridge. In colonial times Robert Taylor took over the management of the business, but it passed from him through five generations in a direct line of descent. In 1912 the Taylor Iron & Steel Company purchased the William Wharton, Jr., & Co., Inc., Philadelphia, for the purpose of expanding the use of manganese steel in track work. The present Taylor-Wharton Iron & Steel Company has five plants: the High Bridge plant, operated directly under the firm name and devoted entirely to the manufacture of manganese steel and other special steel castings; the Easton (Pa.) plant, operated under the name of William Wharton, Jr., & Co., Inc., specializing in track work, such as frogs, switches, curves and track layouts for steam and electric roads, as well as all kinds of light and heavy iron and steel forgings for castings; the Philadelphia Roll & Machine Company, making rolls and rolling mill machinery, iron and steel castings and machinery of a miscellaneous nature; the Manganese Steel Safe Company, Plainfield, N. J., and the Tioga Steel & Iron Company, Philadelphia, which produces light and heavy miscellaneous hammered and hydraulically-pressed forgings, and is now turning out a heavy

tonnage of rough machine and treated forgings for 4-in. navy guns.

THE RAIL JOINT COMPANY, New York, at its directors' meeting on November 21, elected V. C. Armstrong, manager of sales, president, succeeding E. Y. Weber, resigned. Mr. Armstrong and D. P. Wolhaupter of Washington, D. C., were also elected members of the board of directors, succeeding Percy Holbrook and Frank P. Vanderlip, resigned. The other officers of the company remain as at present. G. G. Frelinghuysen, chairman of the board and of the executive committee; W. Paton Thomson, vice-president; Benjamin Wolhaupter, vice-president and secretary, and F. C. Runyon, treasurer. Mr. Weber, the former president, remains a member of the board of directors and of the executive committee. The other members of the executive committee are G. G. Frelinghuysen, V. C. Armstrong, Charles P. Wheeler and W. Paton Thomson.

PERSONAL

H. F. BARDWELL has been appointed New York district manager of the Vanadium-Alloys Steel Company, Pittsburgh, Pa., and Latrobe, with headquarters at New York.

W. R. TOPPAN, who for 15 years was identified with the Kennicott Company, is now manager of the railroad department of the William Graver Tank Works, Chicago.

WARREN R. ROBERTS, president of the Roberts & Schaefer Company, Chicago, has received a commission as major under the Quartermaster-General as executive officer in charge of new emergency construction work during the war.

OSCAR F. OSTBY has been appointed eastern representative of the Grip Nut Company and has opened offices at 2736 Grand Central Terminal, New York, where he will handle general railway supplies. Mr. Ostby was formerly connected with the Commercial Acetylene Railway Light & Signal Company and the Refrigerator, Heater & Ventilator Car Company.

JOHN C. SULLIVAN, engineer and contractor and formerly assistant superintendent of the O'Rourke Engineering Construction Company, died at his home in New York City on October 23. As assistant superintendent of the O'Rourke Engineering Construction Company he had charge of the construction of one of the North River tunnels of the Pennsylvania Railroad.

NORMAN B. HICKOX has been appointed sales and advertising manager of the National X-Ray Reflector Company, Chicago. E. H. Cameron, sales manager, has severed his connection with the company and is now located in Seattle, Wash. Hugh D. Butler, manager Chicago sales, has been promoted to assistant sales manager, and Guy R. Hastings, assistant manager Chicago sales, has been appointed manager Chicago sales. George D. Bryson has been appointed assistant advertising manager.

GEORGE A. PAFF, formerly superintendent of the rod and wire mills at the Aliquippa works of the Jones & Laughlin Steel Company, Woodland, Pa., is now general superintendent at the Monessen works of the Page Steel & Wire Company. Mr. Paff served in the former capacity eight years, previous to which he was superintendent for five years in the rod and wire mills at the Sharon works of the American Steel & Wire Company, having been advanced from master mechanic of the same works.

H. H. SIMMONS, for six years an editor in the engineering department of the Railway Age Gazette and the "Maintenance of Way Section," the predecessor of the *Railway Maintenance Engineer*, has been appointed business manager of the *Railway Maintenance Engineer*. Mr. Simmons graduated from the University of Illinois in civil engineering in the class of 1909 and entered editorial work on the *Railway Age Gazette* at once. With the exception of the last 2½ years, during which he has been editor of the *Railway Signal Engineer*, he has been actually connected with maintenance and engineering department work since that time. Through his work as an editor, taking him on all roads of the country, he had an excellent opportunity to acquaint himself with maintenance problems.

TRADE PUBLICATIONS

DU PONT PRODUCTS.—The E. I. Du Pont de Nemours and associated companies, which include the Du Pont Chemical Works, the Du Pont Fabrikoid Company, the Arlington Company and the Harrisons, Inc., has just issued a convenient little booklet containing a list of all of the products manufactured by them.



Who Uses Mudge Motor Cars?

Railroads operating a total of 55,000 miles of road use Mudge Motor Cars exclusively—more than one-fifth the entire railroad mileage of the United States.

Mudge Motor Cars have been purchased by and are now in the service of railroads operating a total of 192,353 miles of road—more than 75% of the total railroad mileage of the United States.

Go out on the line on a Mudge and you'll understand why Mudge Motor Cars dominate the field.



Mudge & Company

Railway Exchange

Chicago, Ill.



Point of Contact

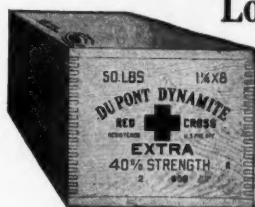
Have you ever tried to analyze your product as to its advertising possibilities? Have you ever gone deep down into its sales possibilities to find the "point of contact" between it and its possible buyers?

Often the "point of contact" is hard to find; for it is always the obvious that escapes us.

If a product or device makes for economy or efficiency, obviously the point of contact is along these lines—but your message should be so placed before the maintenance of way man that your appeal comes within his experience.

Our copy-service department may be able to assist you in establishing the correct point of contact.

Call upon us to assist you whenever you feel that your copy-plan needs the viewpoint of the man outside.



Load Bore Holes With Red Cross Extra

The
Universal Explosive

Red Cross Extra Dynamite is a LOW FREEZING, all-the-year-round, high efficiency explosive especially

Adapted to Contracting

It is made in all standard strengths from 20 to 60% and guaranteed to be as represented by cartridge markings.

Red Cross Extra Dynamites are as strong, stable and efficient as any other standard explosive.

If no test of Red Cross Extra has been made, make one at once—it is the least expensive and most efficient explosive.

Tell us what your blasting work is. Let us suggest efficient and economical ways to use Red Cross Explosives.

E. I. du Pont de Nemours & Co.

Wilmington, Del.

POWDER MAKERS

SINCE 1802



SHERWIN-WILLIAMS TARGET AND SEMAPHORE COLORS

S-W VISUAL RED, GREEN,
YELLOW, BLACK, BLUE
AND WHITE

High-grade permanent colors
furnished in varnish, in
japan and in oil



THE SHERWIN-WILLIAMS Co.

Railway Paint and Varnish Makers

Address inquiries to

798 Canal Road, N. W.

CLEVELAND, OHIO

Railway Maintenance Protective Painting

Six Points of Consideration

- 1—Not the first cost, but what is the final cost.
- 2—Which is the most economical paint per year of service.
- 3—Which is the best paint pigment to resist dampness, abrasion, acid attack, etc.
- 4—Which paint gives a guarantee of invariable quality, because made for over fifty years in ONE QUALITY only, the very best.
- 5—Which paint is standard on many of the leading railroads in the United States, Latin-America and abroad.
- 6—Which paint is a specialty of the manufacturer, using Nature's combination of the flake silica-graphite.

SOLVE your protective paint problems by using

Dixon's Silica-Graphite Paint

which possesses the above six qualities.

Write us regarding your special requirements and send for long service records and illustrated literature of value and interest to you.

Joseph Dixon Crucible Company

Jersey City, New Jersey

Established 1827



Capacity 50,000 Gals. Height 20 Ft. to Bottom
Chicago & Northwestern Ry.

STEEL TANKS For RAILWAY SERVICE

Build For The Future

The Corporations which show the most enviable dividend record over a period of years are those which have followed this policy.

A Steel Tank Is An Asset That Does
Credit To Your Judgment

Chicago Bridge & Iron Works

SALES OFFICES

Chicago, Ill.
New York, N. Y.
Dallas, Tex.
Jacksonville, Fla.
Detroit, Mich.
Havana, Cuba

Charlotte, N. C.
Salt Lake City, Utah
Seattle, Wash.
Los Angeles, Cal.
San Francisco, Cal.
Bridgeburg, Ont.

SHOPS

Eastern: Greenville, Pa.
Pittsburgh, Pa.
Central: Chicago, Ill.
Canadian: Bridgeburg, Ont.

CABLE ADDRESS
"Chibridge Chicago"

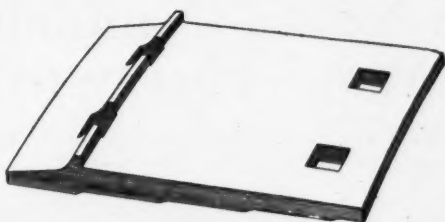
CROSSING THE RUBICON

JULIUS CAESAR took a big chance when he crossed the Rubicon with his veterans from Gaul. He had the courage of his convictions, however, and a loyal army. He immortalized the little river and left his imprint on the institutions of the world.

Many a manufacturer hesitates to make his first venture into the advertising field. Yet he is far better equipped than Caesar when he launched his campaign for an empire.

The manufacturer has every means at hand to ascertain who will read his advertisements—he knows that the RAILWAY MAINTENANCE ENGINEER is placed before every wide-awake maintenance man throughout the country—that in this modern age, every commodity that makes for railway efficiency is examined, analyzed and, if it has real merit, purchased.

RAILWAY MAINTENANCE ENGINEER



THE LUNDIE TIE PLATE

The Lundie Tie Plate is widely acknowledged by railroad men having such plates in track, as promoting decided economy in rail wear, in holding track to gauge and in giving easy riding track. It will far more than pay for itself in reduction of Operating Expenses.

The features of the plate are—a sloping seat inclining the rail, so reducing abrasion and internal stresses in the rail to a minimum—a true camber promoting easy riding—and a bottom, as shown in the cut, so seating itself on the tie that the track is held firmly to gauge without injury to the tie.

The combination of these features, or their mechanical equivalent, is covered by Letters Patent, supported by other Patents covering certain individual features of the plate. Railroad companies pay no royalties on its authorized use.

The undersigned, as the original promoter of the principles embodied in the Lundie Tie Plate, offers plates for sale in fair competition with any other plate in the market, depending on its proven merits for its extended use.

JOHN LUNDIE, 52 Broadway, NEW YORK

"Toledos" Are Helping Build America's Ships



America's great ship-building campaign is demanding tools and equipment that will speed production and reduce labor to the minimum.

It is no wonder then that hundreds of

"TOLEDO" PIPE THREADERS

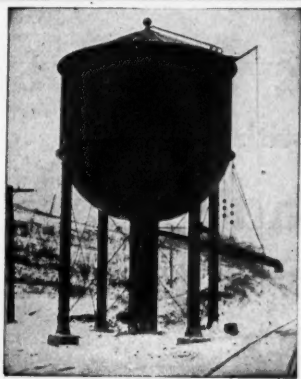
are being expressed on rush orders to various ship-building plants throughout the country.

Years of hard use have proven the efficiency of "Toledos."

A postal will bring you the latest catalogue.

**THE TOLEDO PIPE THREADING
MACHINE CO., Toledo, Ohio**

NEW YORK OFFICE: 369 Hudson Terminal 50 Church St.



Capacity, 60,000 gallons. Height, 36 ft. 8 in. to top.

STEEL RAILWAY SERVICE TANKS

FOR

PERMANENCE AND NEGLIGIBLE MAINTENANCE COST

WRITE FOR RAILWAY BOOKLET NO. 28

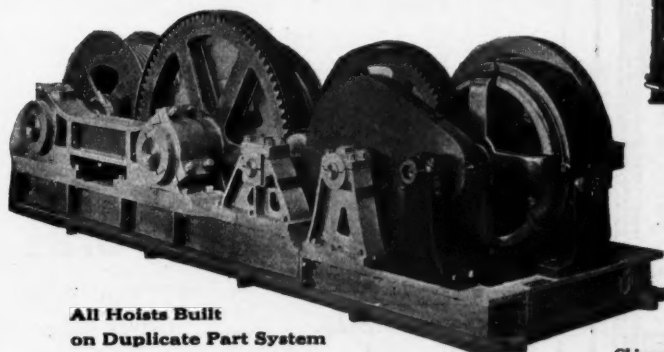
We manufacture and erect Elevated Steel Tanks and Standpipes for every service

Des Moines Bridge & Iron Co.

Des Moines, Iowa, 912 Tuttle St.

Pittsburgh-Des Moines Steel Co.

Pittsburgh, Pa., 920 Curry Building. New York City, 55 Church St. San Francisco, Cal., 5000 Rialto Bldg.
Chicago, Ill., 1290 First National Bank Bldg. Dallas, Texas, 1285 Praetorian Bldg.
Chatham, Ont., 299 Innes Ave.
Shops—Pittsburgh, Pa. Des Moines, Ia.
Canadian Shop—Canadian Des Moines Steel Co., Ltd., Chatham, Ont.



All Hoists Built
on Duplicate Part System

LIDGERWOOD CAR HAUL

Endless Rope Electric Car Haul Hoist.
Pull 17,500 lbs. at 75 F. P. M. Built for
Pennsylvania R. R. Co.

We build hoists suitable for
every character of railroad work

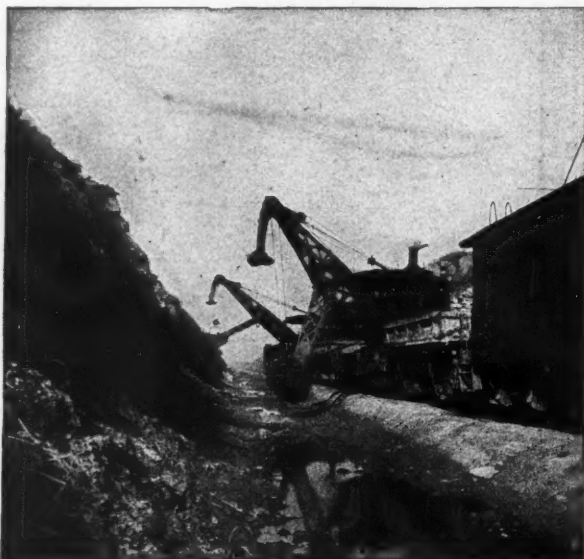
Write for Catalogues

Lidgerwood Mfg. Company

96 Liberty St., New York

Chicago, Philadelphia, Pittsburgh, Seattle, Los Angeles, London, Eng.

"I Size Up a Contractor by the Number of Western Dump Cars Which He Owns"



Ditching with Western Air Dump Cars.

says a Construction Engineer of one of the largest railroad systems in the country.

The efficiency of the maintenance department of a railroad may be "sized up" in much the same way.

Western Air Dump Cars

spell Efficiency, whether in maintenance work or construction.

*Cut out Labor and
Speed up your Work*

We'll gladly put you in touch with any, or all, the 45 or more, big railroads that are using Western Dump Cars. *Write today.*

WESTERN WHEELED SCRAPER CO., Aurora, Illinois
Dump Cars and Earth and Rock Moving Machinery



Marion
*Steam Shovels, Dredges, Draglines
and Kindred Machinery*

MARION Ballast Unloaders form an important group in the big family of Marion Products—the nine distinct sizes and types which we make have for thirty years been standard with railway systems, here and abroad. Marion Ballast Unloaders can be used on

**Straight Track or Curves With
Any Material, Coarse or Fine**

On curves a snatch block will hold the cable in life. Marion Unloaders will unload clay, sand, loam, gravel, crushed stone, boulders, blasted rock and similar materials; can be used on common flat cars or ballast cars with hinged side boards. Particulars gladly furnished on request.

The Marion Steam Shovel Company, Marion, Ohio
Branches: Atlanta, Chicago, New York, Philadelphia, San Francisco, Seattle
ESTABLISHED 1884

226

Track Tools with This Trade Mark



Have stood the Acid Test of
Hard Service to which they
have been subjected in track
maintenance for

Over 44 Years

Verona Tool Works

CHICAGO
McCormick Bldg.

PITTSBURGH
Oliver Bldg.



**From the Grand Trunk Bridge
on the Humber River
To the Grand Central Terminal
on Manhattan Island**

YOU remember "How the Grand Trunk Railway Saved the Old Bridge at Weston," that tale of savings told in this magazine for September. How sixty-three years after its construction they called on the

CEMENT-GUN to save both that bridge and a large sum of money for its reconstruction

Quite different is the tale of the Grand Central Terminal, New York. No ancient landmark that, but modern and up-to-the-minute in all its details.

All its details? No, not quite—listen! The Cement-Gun was used extensively to fireproof the structural steel of this great station, and no doubt its owners wished that instead of extensively, the Cement-Gun had been used **exclusively**, when it is considered that at the present time a great deal of the fireproofing of the poured cement (placed before the Cement-Gun was used) is being removed and **replaced with Cement-Gun construction**.

That is not all—the Park Avenue Viaduct to carry street traffic to the second story of this mammoth structure, to be built under the supervision of the Bureau of Highways, City of New York—but read these extracts from the specifications.

"Sec. 3. (1) All exposed steel work on the under side of the viaduct shall be covered with Portland Cement Mortar.

"This mortar shall be placed by the cement-gun process after the floor slab is constructed and the forms have been removed.

"1½ inches of 'Gunite' (the cement-sand product of the Cement-Gun) will be applied on wire mesh reinforcing."

So it goes the country over. Yesterday it was an old bridge made good as new, today it is something new made better. Every day it is problems solved and time and money saved to the railways through



A Cement-Gun for Every Division

Remember the Cement-Gun is not a restricted article. It can be purchased outright and used by anyone. There are no restrictions about either the Cement-Gun or its usefulness.

Cement-Gun Company, Inc.

Allentown, Pa.

New York Office, 30 Church St.

E. R. Ayers, 1414 Fisher Bldg., Chicago, Ill.; John A. Traylor, Newhouse Bldg., Salt Lake City, Utah; Taylor Engineering Co., 530 Central Bldg., Seattle, Wash.; Taylor Engineering Co., Vancouver, B. C.



LABOR—

The Big Question of the Hour

THE conservation of labor overshadows all other problems in the maintenance of way department today. The *Railway Maintenance Engineer* has consistently taken the lead in discussions of this subject and in line with this policy announces a big "LABOR ISSUE" for February, 1918, which will be the most complete and valuable treatise ever prepared on present day conditions in the field of maintenance labor.

The editorial contents of the "LABOR ISSUE" will group themselves roughly into three parts:

1. A review and analysis of the general situation in the labor market.
2. Descriptions of labor-saving equipment, the field for new devices, the service being rendered by existing devices and labor-saving "kinks."
3. Discussions of methods of holding laborers by improving living and working conditions.

All of this material will be prepared as far as possible from the standpoint of the entire maintenance of way department, including the track, bridge and building, and water service subdivisions. Particular emphasis will also be laid on labor-saving equipment in the advertising pages.

Every Railroad Man

in the maintenance department is vitally interested in the subject covered by the "LABOR ISSUE." It will touch many of his everyday problems and give him tangible suggestions for overcoming some of the difficulties that are vexing him. He will want to watch for it and arrange to insure a copy that he can keep for his personal use. Now is the time to send in new subscriptions.

Every Manufacturer

interested in the maintenance field will want to take advantage of the exceptional advertising opportunity afforded by the "LABOR ISSUE." In addition to the regular circulation in the maintenance department, this issue will be sent to many higher operating and executive officers. This fact, coupled with the unusual interest which its contents will have for railway men, means much to advertisers seeking the best medium to reach this field.

Railway Maintenance Engineer

Chicago	New York	Cleveland	Washington
Transportation Building	Woolworth Building	Citizens Building	Home Life Building

